

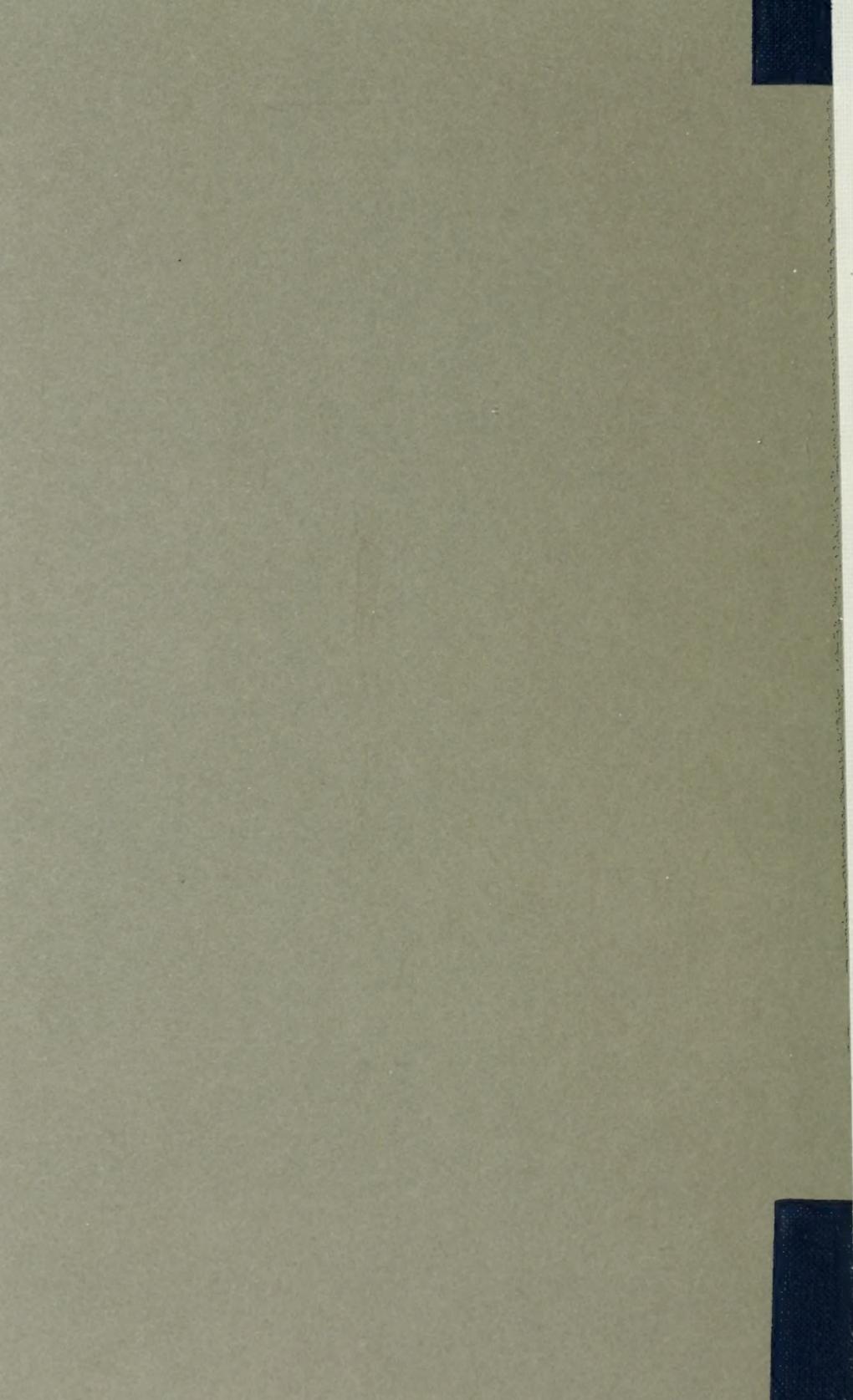
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TATTOOING IN THE MARQUESAS

BY
WILLOWDEAN CHATTERSON HANDY

BERNICE P. BISHOP MUSEUM
BULLETIN I

WITH 38 PLATES

BAYARD DOMINICK EXPEDITION
PUBLICATION NUMBER 3

HONOLULU, HAWAII
PUBLISHED BY THE MUSEUM
1922

KRAUS REPRINT CO.

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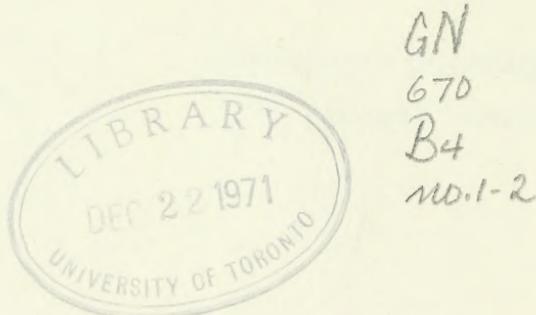
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WILLOWDEAN CHATTERSON HANDY SERVED AS VOLUNTEER ASSOCIATE WITH THE MARQUESAS PARTY OF THE BAYARD DOMINICK EXPÉDITION, 1920-1921. SHE HAS TAKEN SKILLFUL ADVANTAGE OF HER OPPORTUNITY TO OBTAIN WHAT IS BELIEVED TO BE AN UNUSUALLY COMPLETE AND INTIMATE RECORD OF TATTOOING DESIGNS.



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Tattooing in the Marquesas

By WILLOWDEAN CHATTERSON HANDY

INTRODUCTION

Drawings and photographs of tattooing patterns on the bodies of natives were made by the author during a residence in the Marquesas Islands in 1921. As tattooing is now forbidden by the laws of the country and the art is consequently dying out, this collection of the last specimens of tattooing patterns which exist today in the Marquesas has seemed to demand a complementary collection of information regarding the practice of the art, to the end that the beautiful motives might at least be partly accounted for and might some day take their merited place in the history of art. The data have been drawn from natives who have been decorated, from one old *tuhuna*, or artist, who has practised tattooing, and from literary sources, thus piecing together a fairly accurate picture of the practice. Discussion of the design itself, of which the natives know nothing today beyond the nomenclature, is undertaken in a spirit of appreciation and with the hope that the suggestions offered regarding the evolution and significance of this form of decoration may uncover other possibilities and lead to a more conclusive interpretation of the art.

THE PRACTICE OF THE ART

It would appear that this form of body decoration was not confined to certain ranks or classes in the Marquesas, though what might be called a property qualification limited somewhat the complete covering and finer work to the wealthy who could afford to employ the best artists and stand the attendant expense of feeding them and their assistants as well as the large band of *ka'ioi* who erected the special house for the occasion. A father prepared long in advance for the payment for tattooing of his first-born, raising pigs, and planting *ute*, paper mulberry (*Broussonetia papyrifera*), for the making of tapa as gifts for both the *ka'ioi* and the *tuhuna*. Payment also took the form of ornaments, war clubs, and more recently, guns. Langsdorff says that they paid for their decorations according to the greater or less quantity of them, and to the trouble the figures required; that during the thirty or forty years when the body was gone over again and again with the tattooing bones until the skin was completely covered, the cost became considerable; and that such all-over decoration necessarily indicated a person of great wealth (10 p. 120)¹. It follows

¹ Throughout this paper the numbers in parentheses refer to the bibliography on page 26.

naturally that it also appeared only upon people of advanced years (6, p. 130; 13, p. 102-103), a circumstance which undoubtedly led to Captain Chanel's conclusion that the marks had no relation to anything but age (11, p. 111).

While the *tuhuna* was paid generously for work on an *opou*, the eldest son of a wealthy man, no payment was asked of the *ka'ioi*, a more or less unorganized group of younger sons and daughters, who took such part in the preparations as raiding for food and building the special house, and who slipped in to have designs punctured upon them gratis when the *opou* was resting or recuperating from the effects of the operation. It is perhaps these *ka'ioi* to whom Melville (12, p. 49) refers in speaking of the common fellows who were practiced on. Langsdorff was apparently unaware of this custom, for he says that those who could not afford tattooing went without:

The poorer islanders who have not a superabundance of hogs to dispose of in luxuries, but live chiefly themselves upon breadfruit, are operated upon by novices in the art, who take them at a very low price as subjects for practice. The lowest class of all, the fishermen principally, are often not able to afford even the pay required by a novice, and are therefore not tattooed at all. (10, p. 120.)

With the lower classes noticeably less tattooed than the higher, the conclusion was often drawn by early visitors that this form of decoration pointed out noble or distinguished persons (8, p. 155 and 13, p. 84). Berchon, writing in 1859, avows that all classes were tattooed at that time, but that formerly it was a sign of nobility and distinction. From what is to be gathered today from living informants, this is a misconception, in the main, based on the fact that wealth was in the hands of chiefs and distinguished men.

Melville (13, p. 102) at one time assigns tattooing to the warrior class, but present information states that the untattooed as well as the tattooed went to war. That warriors, as well as other groups, wore special designs as badges is stated by modern informants as true in a few instances, and is frequently suggested by the early voyagers to the Marquesas. Spirals over the eyes (Pl. v, 7) are today described as belonging to all warriors in ancient times, while spirals called *kokoata* on cheeks and hips indicated chiefs, as do the tiny pinlike marks (Pl. xxxviii, G. d) to be seen today on the inside of the left ankle. After a battle these marks—according to the informants—were sought for by the priest of a victorious army on the ankles of the slain to determine whether a chief had been killed and a great battle fought. Beyond these distinguishing marks, living informants make no mention of the badges described

by early visitors, such as the *mata-komoe* distinguishing a hero (10, Pl. VIII, fig. 9; p. xv), the marks of high birth put upon the arms of women in families of chiefs (18, p. 222-223), the tattooed right hand and left foot of women as a sign of wedlock (13, p. 221-222). Mr. Linton was told that only chiefs had their feet tattooed; but this is not borne out in the late practice of the art nor corroborated by other informants. The confusion probably arises either from the distinguishing chiefly marks being upon the ankle, or from the custom of tattooing the body of the *opou* from the feet up, contrary-wise to that of the *ka'ioi*.

The only distinguishing feature of the tattooing of a *ka'ioi*, as reported today, is the order in which the designs were put on, the face being decorated first. The reason assigned by a Pua Ma'u informant for the custom of beginning with the feet of the *opou* was that the face if tattooed first was liable to become infected and cause a stoppage of the operation. It is possible that the reverse order in the case of the *ka'ioi* was the result of indifference as to their fortunes, but it is also possible that there was here a fundamental class distinction. There is no proof today that the work was not of the same pattern as that of the *opou*, though Melville thought he distinguished a difference in the quality of the work put upon "inferior natives," their designs appearing to him like daubs of a house-painter's brush (13, p. 250).

Berchon says that tattooing was an obligation rather than a mark of distinction for women, that the right hand must be tattooed by the age of twelve so that it might be used in making *popoi*, in making *pakoko* (the circular movement of two fingers in taking up *popoi* to eat it) and in rubbing dead bodies with coconut oil (1, p. 114-115). Natives today say that an untattooed hand could not make *popoi* nor eat it from the same bowl as a tattooed hand, that a tattooed man could not eat with a woman, and that a man with all his designs finished could not eat with a man whose designs were unfinished; but any reason for these requisites beyond their being "pretty" is unknown. Women would not marry untattooed men, probably because the decoration represented either wealth, endurance of pain, style, or all three.

A special effort was made to find some trace of banqueting societies distinguished by marks tattooed on the chest, which Krusenstern, Langsdorff, and Melville² describe (8, p. 159-160; 10, p. 121-122; 12, p. 50-51); but no memory of anything in the nature of such fraternal orders supported by the chief and tattooed gratis is discoverable today. With Berchon's con-

² All of the detailed information of Krusenstern and Langsdorff came from two white sailors living among the natives, whose accounts are in many instances unmistakably erroneous and exaggerated. It would not surprise me in the least if

clusion that the fact reported must have been "quite exceptional" we must agree. It was customary, however, during famine times, for people to seek the service of chiefs in order to be fed, and it may have been the whim of some chief to have a particular mark tattooed upon them, but this was certainly not a general custom. Indeed, Melville relates the "Hanamanoo" episode as an especial and unusual case; and it does not seem unlikely that the same story is at the basis of both his and the Russians' accounts. They have probably misinterpreted the ordinary custom of the father of the *opou* during the period of tattooing feeding the *ka'ioi*, who were no more closely organized as a society than is our own "younger set," to whom they were somewhat analogous. This would fit, too, with the custom of the *tuhuna's* giving them samples of their art gratis during the rest periods of the *opou*.

A careful search for any possible significance of face designs as tribal marks, corroborative of Porter's statement to this effect (14, p. 114), calls forth today, except in one instance only, vociferous refutation. However, that face patterns were insular during a later period of the art is certain, the oblique *paheke* belonging to Nuku Hiva, the horizontal bands called *ti'ati'apu* being worn by Hiva Oans, and the latter's variant, the *ihuepo*, whose central band covers the nostrils themselves, being prevalent on Fatu Hiva. Lacassagne (9, p. 79) quotes Lombroso as declaring that face tattooing on Nuku Hiva distinguished two enemy factions, the one being marked by a triangle, the other by a circle. Triangles are associated with the tattooing of the inhabitants of Tai-pi Valley by Melville and Berchon, and these Tai-pi were powerful enemies of the tribes of Tai o Hae Valley. More than one present-day informant has stated that men of a certain tribe living in Tai o Hae were marked with a great black circle on the face (Pl. v, 10). Seeing the two styles and finding them associated with two enemy factions, it might be natural to conclude that face decoration was to distinguish enemies; but this is the one instance in which a tribal significance is assigned today to a face design.

That the operation of tattooing was performed during propitious seasons or at times of importance in the life of the individual to be decorated has been reported by Desgraz (18, p. 223). Living Marquesas informants place its practice during the dry season when there was no breadfruit to be harvested, during the months of October, November, December and early January. The women, whose tattooing may still be examined, place the beginning of their work at from seven to twelve years of age; the

Melville made up his story of the "Hanamanoo" episode after having read Langsdorff or Krusenstern.

men, from fifteen to twenty. Within these limits fall the more or less definite statements of such early writers as Garcia, Desgraz, and Berchon, Porter interpreting the time as "when they are able to bear the pain." All imply—and Krusenstern (8, p. 155) definitely states—that the beginning of the operation was connected with the period of adolescence. Berchon (1, p. 113) tells us that pregnancy would hinder the success of the work and that it was never undertaken for a woman when she was in that condition, from which we may again infer that the coming of puberty was the time for starting the bodily decoration. There seems at the present time to be no definite connection in the mind of the Marquesan between the two, and the fact that tattooing was practiced during the growing or maturing season of the land just before harvest-time seems also to have no significance at present. However, the celebrations associated with the harvest and with the completion of the tattooing of the adolescent youth of the land were united in a great *ko'ina* or feast. It may be remarked, too, that there is at present no indication that important times in the life of the individual, other than adolescence, were the occasions for tattooing, although Langsdorff, in a description of the *enata* design, says that it was put on when an enemy had been killed or eaten (10, p. xv).

As has been stated, preparations for the tattooing of an *opou* began with the raising of pigs and planting of *ute* for gifts and payment for *tuhuna* and *ka'ioi*. Several days before the beginning of the operation, the father announced that the *oho'au tiki*, or special house for the occasion, was to be built. About one o'clock on the morning on which the erection of this structure was to take place, two great drums (*pahu*) and two small ones (*hutu*) were beaten on the public festival place, to declare the beginning of the *tapu* and to summon the *ka'ioi*. These, usually from forty to eighty in number, immediately gathered at the festival place and together proceeded, under direction of the *tuhuna*, to raid the place of the *opou*'s father. They demolished his houses and those of his relatives, with the exception of the sleeping houses; they seized not only material for the building of the *oho'au*, but that for making *tapa*, or the *tapa* itself in the event of its already having been made. Enough pigs and other food, sufficient to last for the entire period of the operation, its length depending upon the sickness of the *opou*, were taken for the feeding of the *ka'ioi*, *tuhuna*, and all those who were to stay in the *oho'au*. Not only was the father of the *opou* the victim of this *fao* or seizure of food, but also his father's sisters and even other relatives of the father and mother, if the duration of the operation was extended; and it was these relatives who cooked the food during the entire time.

The *oho'au tiki*, together with a sleeping house and a cook house, which were placed on a stone *paepae* near a *me'ae* (sacred place), or a *tohua* (public place), was erected for the first-born or adopted boy (*matahiapo*), other sons usually being *ka'ioi* and achieving their tattooing piecemeal and gratis in the *oho'au* of the *opou*. This house, which belonged with all its appurtenances to the *opou* and not to the *ka'ioi* who built it—although they slept in it during the period of the operation—was carefully built, though it was lashed with the coarse strips of hibiscus bark rather than with the finely braided *pu'ukaha* or coconut fiber cord usual in other dwellings. Melville might seem to suggest a different custom in Hiva Oa from that of Nuku Hiva in the description of the tattooing's being performed in large houses belonging to the *tuhuna* themselves (12, p. 48-49); but all modern recollection in Hiva Oa is of the similar custom of building the special *oho'au* for the *opou*. It may be said in passing that neither Melville's descriptions of the spacious houses of the *tuhuna* with their numerous small apartments set apart by screens of *tapa* for private patients and of the small tents of coarse *tapa* erected by itinerant *tuhuna* for patients at the times of religious festivals, nor Langsdorff's account of the operation for persons in middling station being performed in houses erected for the purpose by the tattooers and tabooed by authority (10, p. 120), are corroborated in the information gathered last year in the Marquesas. The Russian says further that the women were not, like the men, shut up in a tabooed house during the operation, but that it was performed without ceremony in their own houses or in those of relatives. This is corroborated today, particularly on Nuku Hiva; though sometimes, we are told, a small house called the *fa'e po'a* (*po'a*, coconut thatching) was built alongside the family dwelling for the tattooing of a girl and in it lived the whole family during the entire period of the operation, the main house being *tapu*, though the *fa'e po'a* was not.

The *oho'au tiki*, itself, which we must take as the usual scene of the operation, was very *tapu* to outsiders. Those who entered it could have nothing to do with women, who were spoken of at this time as *vehine pu'atea* (*pu'atea*, a kind of tree with soft wood). Indeed these men must hide if a woman were even sighted at a distance, and it was necessary for them to cook for themselves. The men who held the legs and arms of the *opou*, and who fanned flies during the work, were especially *tapu* and had to be served with special food. There seems to have been no regular food *tapu* for the patients during the period of the operation, though according to early visitors, there were dietary restrictions apparently for the sake of health. Garcia says the patients were forbidden for several days to take certain kinds of nourishment, such as pig and

kava, and Melville speaks of the small portions of food that were pushed under the curtain by unseen hands to the *tapu* patients within the apartments, the restriction in food being intended to reduce the blood and so diminish inflammation; Langsdorff reports that the patient must drink very little for fear of inflammation, and must not eat early in the morning.

The work was performed by *tuhuna patu tiki* (*patu*, to mark or strike; *tiki*, designs), artists, evidently trained in the school of experience, some of them coming to enjoy great vogue on more than one island. Although Garcia states that the office was hereditary, each great family having its family of tattooers trained from generation to generation for its use, nothing of the sort can be traced today. According to modern informants, skill alone was qualification for practice and requisite for patronage. Langsdorff tells of novices who, for practice, operated upon poor people at very small charge, and Melville reports even the hiring of "vile fellows" as models on whom they could practice.

All present-day information denies Melville's statement that there were orders of tattooing artists. It is more likely that there were itinerant members of the profession, as he states. All seem to have practiced quite independently, although there was probably the kind of bond between them that followers of any profession feel. It is said in Ua Pou that there were different *tuhuna* for men and women because of the rule of *tapu* which ascribed to men greater sacredness than to women, but this was not true during the latter days of the art. No woman *tuhuna* was ever heard of. There were evidently contests between *tuhuna*, two or three working at the same time in an *oho'au*, attempting to excel one another in rapidity of execution and delicacy of designs. In the light of knowledge about the ancient native training in other artistic lines, it is possible to hazard the guess that to be accepted at all as a *tuhuna*, a thorough acquaintance with all the conventional units of the art was requisite; for, although individual *tuhuna* certainly varied and elaborated designs at will, yet they did not stray from the basic units.

A *tuhuna* was aided in his work by four or five assistants called *ou'a* (or *kou'a*—translated by Dordillon, pupil, disciple—meaning also shrimp). He was consulted as to the choice of designs, his decision apparently being usually accepted, although the *opou* was free to select his patterns. He outlined the designs upon the body with a piece of charcoal. But it was the *ou'a* who held the arms and legs of the patient, who stretched the skin to make a smooth surface upon which to work, who fanned the flies from the bleeding wounds, and who often, it is reported, filled in the outlined designs.

Before the coming of the *tuhuna*, the father of the *opou* had prepared the pigment (*hinu*). The preparation of this was a very *tapu* operation, the man making it being forbidden all relationship with women during the period; and, according to Lesson (1, p. 107-108), it was necessary for a virgin to aid him in the work. The shells of the *ama* nut (*Aleurites triloba*) were heated so as to open easily (7, p. 45), and the kernels placed over a fire in a kind of pocket of stones which allowed the smoke to ascend through a small passageway in order to collect on a smooth stone (*pa'e hinu*). Upon this stone a constant tapping was kept up while the soot collected to the depth of about an inch. This process, according to Berchon, was called *amahi ama*. The soot-covered *pa'e hinu* was then placed on a banana leaf and left in the sun to dry, being kept thus until the *tuhuna* arrived for his work. Thereupon, the father, according to present-day information, mixed the soot with plain water in a small coconut shell (*ipu hinu*) and gave it to the artist. Marchand Langsdorff, and Porter agree upon water as the solvent; but Berchon further reports that the ink, which he calls *kaahi*, was made by mixing the soot with coconut oil; while Melville (13, p. 246) gives vegetable juice as the liquid. He and Langsdorff describe the use of the ashes, rather than the soot, of this nut kernel, and Porter thought burnt and powdered coconut shell was used, but apparently no other pigment save carbon was ever employed in the Marquesas, as all early voyagers remark only the dark blue or blackish coloring. (See 15, p. 16; 14, p. 78; 10, p. 118; 8, p. 155; 13, p. 158). Jardin (7) speaks of carbonizing and pulverizing the kernels of the *ama* and mixing the powder with water to trace the designs on the body, and it may be that the residue of the burnt nuts was so used.

When the *tuhuna* arrived, bringing his instruments in a bamboo case seven or eight inches long (*pukohe fau hinu*), stoppered with a wad of tapa, he spread them out upon a piece of tapa on the ground, ready for use. The instrument is generally known as *ta* (to strike), but Berchon (1, p. 110) gives the following nomenclature for its various parts: *ta'a* (a point) for the toothed end, *kakaho* (reed or cane) for the horizontal support of the teeth, and *ta-tiki* (strike-tiki) for the baton (Berchon, p. 110). There was always an assortment of these toothed ends of varying fineness or coarseness appropriate for all grades of work from the delicate hair lines to solid patches. The flat instruments for straight lines and gradual curves were of human bone, sometimes of the bones of enemy sacrifices (*iri heana*). They were about three inches long, flat and slightly wedge-shaped, and toothed or comblike at the end. Instruments for the smaller curves were of the bones of the *kena* (*Sula piscatrix*),

or of a *tapu* bird on the small island of Fatu Uku, the leg bones having been used (at least they are used for the instruments seen today), and according to Langsdorff, wing bones also. Marchand describes these *ta* as sometimes of tortoise-shell; Berchon adds, of fish bone; and Melville mentions sharks' teeth: but no trace of combs other than of human or bird bone remains today. The number of teeth varied from three to about twenty—Melville saw some with a single fine point—according to the size and use of the instrument. Melville says that some had points disposed in small figures, so that the whole design was printed at a single blow.

These bone combs were inserted into a slit in a piece of reed stalk, bamboo (10, p. 118), or ironwood (11, p. 110; 1, p. 109), six or seven inches long, which acted as a horizontal handle (see, however, 12, p. 51, note), held, while in use, in the left hand of the *tuhuna*. This was, as far as could be ascertained today, straight, though Melville speaks of curved ones. The baton, about three quarters of an inch thick and from a foot to eighteen inches long, was of hibiscus wood.

Although everything connected with the operation itself was extremely *tapu*, tattooers in general, in Nuku Hiva at least, being under the auspices of the god Hamatakee (2), Tahu being the god of the *tuhuna* and the *ka'ioi*, Pupuke of the *ou'a*, yet there are no records of opening ceremonies. The patient, clad only in a girdle, was simply laid upon the floor, arms and legs held by four *ou'a*. When a design had been sketched in charcoal upon the body, the *tuhuna*, or an assistant, held in his left hand the toothed hammer and a piece of *taipa*, with which by a dexterous twist of this hand he wiped away the blood as it flowed from the punctures made in the skin by the gentle tapping on the top of the comb with the baton held in the right hand. As he worked, he kept a sufficient supply of pigment upon the teeth by dipping two fingers of his right hand into the ink and rubbing them upon the comb. Garcia, Marchand, and Berchon agree with this procedure; but Langsdorff and Krusenstern declare that the punctures were made in the skin until the blood oozed out and then the dye was rubbed in. While the tapping went on, the operator chanted in rhythm to his strokes the following words to allay the pain of the *opou*:

Ua tuki-e, ua tuki-e, ua tuki-e,
Ua tuki-a, to tiki-e,
Poparara³ to tiki-e,
O te tunane o te kui-a,
O te tuehine o te kui-a,
To'u tiki-e.

It is struck, it is struck, it is struck,
It is struck, your design,
Tap-tapping your design,
The brother of the mother,
The sister of the mother,
My design.

³ Poparara is onomatopoetic, the sound of tapping.

Chants for women do not seem to be general. At some time during the operation, the *opou* was given a new name, referred to as *patiki*. This was taken from some personal defect of his own, such as a blind eye, for example, or from some imaginary peculiarity of the genital organs of his father or mother.

The operation, as may be imagined, was extremely painful and the patient cried and screamed without restraint. Berchon notes that after each sitting, there were from eight to twelve days of local inflammation, followed by fever and sometimes swellings, which were at times fatal. Light inflammation and swelling and ulcers lasting for several days (6, p. 132; 11, p. 110; 10, p. 118) seem to have been usually the most serious results of the rigorous treatment. The juice of the banana stem was used as an ointment (*paku*) to hasten healing. Berchon says an emollient of hibiscus leaves was applied to relieve the inflammation.

The duration of the operation depended largely upon the fortitude and health of the patient. A Nuku Hiva man is reported to have been completely covered in three days; the legs and back of one man of Hanamenu were done in seven days; but as a rule the designs were put on in more leisurely fashion, a section of the body being covered at a sitting, with three-day rest periods called days of blood (*a toto*) after each, so that the operation covered from two weeks to four months. Under such conditions a woman's lips and shoulder might be decorated in a day, a man's legs from knees to ankles, or perhaps his thighs and buttocks. Langsdorff says that the first sitting usually lasted from three to four weeks and that only the groundwork of the principal figures upon the breast, arms, back, and thighs, was laid the first year, additions, however, being made for years at intervals of from three to six months.

After the operation, fruits of noni (*Morinda citrifolia*) the most usual healing agent, were offered at the *me'ae* or sacred place; the *tuhuna* was paid; and, when the *tapu* was lifted, the sacred *oho'au tiki* was burned (though not the common house of women); and all those participating in the operation, who had not been allowed to bathe during the entire time, now went first to the sea to bathe, afterwards to the river. This accomplished, they covered themselves with fragrant ointment, which turned the skin yellow so that their new patterns showed brilliantly. Meanwhile, relatives had prepared such ornaments as tortoise-shell crowns, girdles of tapa, feather head ornaments, earrings, and the like. These they left outside their houses on the night before the festival (*Ko'ina tuhi tiki*; *Ko'ina*, feast; *tuhi*, show; *tiki*, design), which was always given to celebrate the completion of the work, and the newly decorated girls and boys donned them before their appearance on the paved floor of the

festival place where admiring friends and relatives were gathered to view them. There, two large drums (*pahu anaana*) and three small ones (*tutu*) were beaten, the *opou* marching with the *ka'ioi* around the paved area to show his designs. While two men and two women danced, the *ka'ioi* accompanied them with handclapping and the chanting of a *putu* or special chant for the *oho'au patu tiki*. In an unpublished manuscript Dordillon and Père Pierre state that at this feast a human victim was sacrificed and eaten. When a man gave a feast in celebration of his wife's acquisition of a bit of tattooing, as Langsdorff reports was sometimes done (10, p. 121), she was allowed to eat hog's flesh as a very special privilege.

THE DESIGN

Any attempt today to make a first-hand study of tattooing design must be based upon the examination of not more than a hundred and twenty-five persons who are the only living examples of the practice and whose designs represent for the most part a late development of the art, and upon their explanations and descriptions, and those of the single surviving practitioner of the art, whose actual practice ceased many years ago. The practice was forbidden by the French in 1884 and the edict was enforced as strictly as possible from that time on in the group of Nuku Hiva and Ua Pou, where the government was in occupation. On Hiva Oa, Tahu Ata, Fatu Hiva, and Ua Huka, the practice continued some years thereafter in the absence of authority to abolish it. As a consequence, one finds in the northwestern group that the majority of examples is the work of *tuhuna* of the southeastern islands, a few very old people, alone, representing that of the former islands. Just as these northwestern natives now living went surreptitiously to *tuhuna* of the other group to be tattooed upon parts of the body that would not show beneath their clothes, so in the southeastern group those who continued the practice after the prohibition was actually enforced there, about twenty-five years later than in the more closely espionaged islands, were decorated chiefly upon the legs from hips to ankles where dress or trousers would cover the pattern. Gradually, even this practice ceased, and today the only tattooing that is done is now and then of names in print upon the arm. It will be seen from this, that only upon very old people can anything approaching a full suit of tattooing be seen. Though there is but one man living who, as far as I know, might be called fully tattooed, still there are to be found on different subjects designs for practically all parts of the body originally covered. There still remain several women fully tattooed, probably for the reason that their designs are less conspicuous. The plates herewith

represent about as full a collection as could be obtained today of the tattoo designs of the Marquesas. What may be learned of the history and meaning of the art from the study of these designs may be of interest.

The parts of the body ornamented differ today, as they have always, for men and women, a complete suit of tattooing for the men (Pl. 1) covering the crown of the head (Pl. v, 9), face (Pls. III, IV, V) including the eyelids, often the inside of the nostrils, tongue, palms and back of the hand (Pls. VIII, A; XI, C), arms (Pls. XII-XIII), legs (Pls. XXIX-XXXVIII), and the entire trunk (Pl. XIV) but not the penis, which all save one of our modern informants deny ever to have been tattooed. (See also: 15, p. 16; 4, p. 14; 5, p. 232; 14, pp. 78, 114; 11, p. 111; 10, pp. 122-123; 8, p. 155; 17, p. 306; 13, pp. 83-84, 90-91; 18, p. 222.) At the present day, the one man who might be said to be fully tattooed or *moho*, is lacking the crown piece, save for a section, and the tongue and palm coverings. From the earliest times accounts such as those of Cook, Marchand, Langsdorff, Krusenstern, Melville, Berchon and Porter note the simpler decoration of the women, G. Forster observing none on them. On the bodies of women observed today, patterns are found on the lips running back to the base of the gums (Pls. II, A; VI, A), on the ear lobes, behind the ears (Pl. VI, C; Porter, p. 114), on the curve of the shoulder (Pl. VI, B; see also 13, p. 95; 6, p. 132), on the lower back of which but one example remains, as far as known (Pl. XV), on the hands (Pls. VII-XI) and on the legs from the buttocks down (Pls. XVI-XXVIII). One old woman of Nuku Hiva describes the tattooing on women as covering also, formerly, the whole length of the arms on the inside, the buttocks, and the abdomen. She, as well as all others living today, declares that the vulva was never tattooed, although one woman reports a girdle that came around in front.

Various reasons are given for covering different parts of the body. The decorated hand was noticeable in kneading and eating *popoi*. The under-arm pattern made a fine showing when the arms were uplifted to strike with the war club. Shoulder and chest decorations were displayed when men walked with arms crossed behind the back. Circular motives on the inside of the knees were in evidence when men sat cross-legged. The inside thighs where the loin cloth hung and covered them were often left vacant.

There are numerous indications both in the types of design to be seen today and in descriptions and stories of natives and of visitors to the islands, that fashion in this mode of decoration was no exception to the rule of fashion's fickleness. There are to be seen naturalistic, geometric, and conventional motives, both symmetrically and irregularly arranged; there are stories of inter-island exchange of motives and of

the teaching of the *tuhuna* of the northwestern group by those of the southeastern; there are to be found in literary sources accounts of the vogue of different artists and statements from which may be deduced complete changes in the type of design. With a view to discovering how dependent style was upon the taste and originality of individual artists, the names of all artists who executed the designs recorded were noted. When two pieces of work done by the same *tuhuna* were found, the choice of pattern seemed sometimes to be identical (Pl. xi, C), sometimes altogether different (Pls. ix, B and x, A), while the work of different *tuhuna* was sometimes identical (Pl. XIII, B). It would seem that all *tuhuna* drew, more or less at their will, from a single body of design.

In the hope of making as clear as possible the probable evolution of this art in the Marquesas towards the elaborate conventional design that prevailed when it was forbidden thirty-eight years ago, the following details are set down.

Quiros records in his description of Mendaña's visit to the southeastern islands in 1595, the observation of "fish and other patterns painted" upon the faces and bodies of the natives. This is corroborated by a living informant who says that formerly women had birds and fish behind their ears and on their legs, and men are reported to have had lizards on their faces. The next word from a voyager that comes to us of this group is dated nearly two centuries later when Forster observes in 1772 that the motives in Tahu Ata are not naturalistic but geometric, taking the form of "blotches, spirals, bars, chequers, and lines;" while J. R. Forster confirms this analysis, adding however, "circles," and Marchand in 1790 reiterates the two lists and swells them with "parts of circles . . . square or oval figures . . . inclined and variously crossed lines." It would appear, then, that in the southeastern islands during these hundred and eighty-odd years, there had been in the type of design a change from the naturalistic to the geometric.

We have no similar statements regarding what was happening in the northwestern group during the early period, the first observations there being set down by Marchand in 1790, who visited both groups. Though Marchand touched for a short time at only two bays in the northwestern islands, still it is valuable to have his statement that he finds in Ua Pou the same custom of tattooing as in Tahu Ata but not so general, few tattooed individuals being seen (II, p. 167). Unfortunately he does not define the types of motives there as he does in Tahu Ata. Just a few years later, however, in 1803, Langsdorff gives a number of drawings from the northwestern group with explanations of them (10: Pl. vi, p. 117; Pl. vii, p. 119; Pl. viii, p. 122; pp. XIV, XV, XVI). which show that

by the beginning of the nineteenth century, designs in Nuku Hiva were a combination of purely geometric figures with all save two of the principal conventional units of the latest phase of the art that at the present day is universally attributed by the natives to the southeastern islands, which for convenience may be referred to as the Hiva Oa development. Dor-dillon (3) gives the names of many motives which have completely disappeared today, most of them recorded in the northwestern group. Of these, several would indicate naturalistic treatment: *a'akira*, line of sea builders; *aukohuhu*, a seaweed; *haha'ua*, a kind of ray fish; *homae*, a fish; *koao*, a fish; *matuku*, a bird; *keehue*, wing; *tikau'e*, fly; *toetoe*, crab. Furthermore, in 1843 Melville saw fish and birds and an *artu*(?) tree tattooed on natives of Nuku Hiva (13, p. 157); Desgraz, the same year, describes fish and shells (18, p. 223); Garcia in 1845, fish; Berchon, in 1859, boots, gloves, suns, sharks, cockroaches, coconuts, lizards. In addition to these naturalistic motives, all these visitors also saw geometric patterns, showing that in the northwestern group as long as we have any record of tattooing there, the two types have existed side by side as they do today. (For naturalistic motives see Pls. xviii; xx, B, c; xi, D; xxx, j; for geometric, Pls. xviii, xix, xx, A, b; xxi, D, a).

On the other hand the earliest drawings obtainable that are known to be of the Hiva Oa type are those drawn by Proiho and an old *tuhuna patu tiki* of Fatu Hiva (Pls. ix, A; xii, C; xiv, B; xvi; xxx). These are impossible to place chronologically and are no longer found upon the body in exactly these forms. Among them is found but one genuinely naturalistic motive (Pl. xxx, j) but a combination of geometric figures such as squares (Pl. xii, C, b and c), bars (Pl. xxx, C), oblique (Pl. xxx, d) and variously crossed lines (Pl. xvi, d; xxx, a; xxx, k), with simple forms of all the modern conventional motives save the *matakomoē* of Langsdorff, now called *po'i'i* (Pl. xxxiii, e) and the flower-like or sunlike disk variously called *puahitu*, *puahue* and *huetai* (Pl. xxxiv, e), both of which are to be found in primitive form in the early Nuku Hiva art (Pl. xxix, f, c). Today three naturalistic designs, and these very crude, are to be found in the southeastern group, and these are all the work of the same artist. (Pls. x, A, 2, a; xxviii, D, E). The designs described as belonging to former Nuku Hiva and Fatu Hiva styles have in common several units, many of them in primitive form which are to be found today in the Hiva Oa style: for example, the *koheta* (Pls. xxx, a; xxix, a and b; xxxiv, a and b); the *ka'ake* (Pls. xxx, i; xxix, h; xxxiv, g insets); the *hikuhiku atu* (Pls. xxix, b; xxx, g; xxxiii, h); and the *mata hoata* (Pls. xxx, e, lower a; xxix, g; 1, D, thigh); and what I

conceive to be the forerunner of the underarm *ipuoto*, the original *po'i'i* or shellfish motive (Pl. ix, A, a; xii, A, B, D).

An examination of the extant examples of the art shows a distinct cleavage between the two groups in their conception of design, that of the southeastern being purely conventional with but minor relics of the geometric and the slightest trace of the naturalistic; that of the northwestern showing several examples of naturalistic art, many of the geometric, and a simpler form of the conventional than the other. Marquesans are all agreed, that, as far as tattooing customs went, the islands were divided into two groups: Nuku Hiva and Ua Pou forming one; Hiva Oa, Tahu Ata, Fatu Hiva and Ua Huka—because of its close intercourse with the north and west coast of Hiva Oa—forming the other. It may be remarked that Fatu Hiva is accepted as the home of carving and modern tattooing; but, being regarded as a kind of suburb of Hiva Oa, the latter island is referred to as the center. Several trustworthy informants declare that before the whites came, *tuhuna patu tiki* went from Hiva Oa to Nuku Hiva to teach them the art there, as before this time the Nuku Hivans used only "dirty black patches." We know that, by Melville's time, a transfer from the one to the other group was taking place, for he says that when he was in Nuku Hiva in 1843 (12, p. 48), Hiva Oa enjoyed a reputation for tattooing in the whole group. At the time of its discontinuance as a practice, it was certainly Hiva Oa tattooing that prevailed over the whole group.

Face patterns seem to have followed the same general lines of development, with a period at least of divergent styles in the two groups. Some Hiva Oa natives say that lizard motives were anciently used on the face; but early voyagers indicate only geometric figures, Marchand—the first to attempt to define them—speaking vaguely of various lines on the forehead representing kinds of hieroglyphics or characters of Chinese writing (16, Vol. II, Pl. 133; 10, Pl. vi, p. 117). Langsdorff pictures a man with a spiral on his cheek (10, Pl. vi, p. 117) and this convention is confirmed by living informants who describe these *kokoata* (Pl. v, 7) on the faces of warriors and chiefs. Today, naturalistic motives are not to be seen upon the face, but what may be a descendant of the spiral occurs on Ua Pou in a fine design on the nostril (Pl. iv, 7, 10; V, 4). The prevalent style called *ti'ati'apu*, to encircle several times, consists of three solid stripes, sometimes seen as unfinished half-stripes, banding the face horizontally, one across the forehead, one across the eyes and the third across the mouth. (See Pls. III-v.) This is everywhere declared to be a Hiva Oa style and there is a variant where the mouth band covers the nostrils,

said to belong to Fatu Hiva. Of this but one living example could be found (Pl. v, 8). Of the old Nuku Hiva *pahcke*, distinguished by an oblique band running from the right center of the forehead across the left eye and cheek (Pl. v, 5), there remain today but two examples. What form the transition from spiral to band may have taken can only be conjectured. A reliable Hiva Oa informant describes a former convention of that island which seems to be a combination of over-eye arcs—perhaps a relic of the spiral—, of *pahcke* and *ti'ati'apu* (Pl. v, 6; see also Langsdorff's description and Pl. VIII, figs. 10, 11, p. xi). In Melville's time, both the modern styles were seen on Nuku Hiva, and in the tattooing to be seen today, the Hiva Oa has replaced the Nuku Hiva design completely. In the fine inset and inter-band motives are to be found both geometric and conventional motives, never naturalistic.

How may this divergence between groups and the growth from the naturalistic through the geometric to the conventional—as seems to be the probable development—be accounted for?

Perhaps it may be postulated that before the seventeenth century naturalistic motives were used in both groups, that during the two unrecorded centuries geometric figures appeared in the southeastern group, that these gradually replaced the naturalistic there or transformed them into the conventional, and that at each stage of development the new styles were carried to the northwest where they did not so completely obliterate or amalgamate the native patterns, some of which persist to this day in their old form.

Influences which may have contributed to such a development are suggested by an examination of adzing and carving motives. Ornamental adzing in simple geometric patterns seems to have been the primitive form of wood decoration. Imitation of its technique as well as the use of its motives on the body is evident. The former is seen in the filling of spaces, ordinarily made solid in color, with parallel, oblique, zigzag or wavy lines (Pl. III, 7, inset in eye band; XXI, B, b; XXXVI, insets in e and g; XXXV, inset barred teeth in f; XXX, d); in the use of the intersection of adzing lines to form the motive called *kopito* (Pl. XXIII, A, d; possibly also the inset in the forehead band in Pl. III, 8). In tattooing are found such housepost motives as the cross formed by adzing off the corners of a square (Pl. XII, C, b), concentric circles (Pl. XII-E, b) and concentric half-ovals (Pl. XXVIII, E; XVIII, a). It is possible that the use of four triangles in a square or oblong, as well as the conception of design in bands may have come from this art of adzing wood. When it is remembered that wood was scorched before a pattern was adzed or carved upon it, so that the design was in natural wood color, the back-

ground in black, the conclusion suggests itself that such motives as the *pahito* (Pl. xxiii, A, *j* and *k*, left and right) and the flamelike ends of triangles (xviii, xix *A*) may be copies of the black background left by gouging alongside a line in the one case and by cutting short lines vertically out from a straight line in the other. It seems as if the checkerboard pattern, of which but one example is extant, must have originally been carved on wood (Pl. xxi, *D*, *a*). Parallel and wavy lines and other adzing and carving concepts are used on the body, as seen in the preceding example. It will be noticed that most of these coincidences are found in Nuku Hiva, Ua Pou or early Fatu Hiva types, rather than in the prevalent modern patterns, though among these are two examples of the scroll so prominent in carving (see also Pls. xxxviii, *D*; xxxv, *c*).

Wood carving, as distinguished from adzing, which decorated bowls, paddles, clubs, etc., seems to be a mixture of adzing patterns, geometric squarish spirals and a few of the conventional motives usual in tattooing. Of carving technique copies such as the veining along a midrib (Pl. xxviii *E*) are found in tattooing; of carving design, similarities to old war club patterns (Pl. vi, *B*; x, *A*, *2*, *a*; the *tava*, which was formerly burned on a plank in the house of the inspirational priest (Pl. xvi, *m*); and such small units as the *tiki* in forehead and mouth bands of Plate iii, 7. Common to both carving and tattooing are such conventional motives as the *honu kea* or woodlouse, the *mata hoata* or brilliant eye, the *ka'ake* or underarm curve, the *poka'a* or wooden block for carrying a load on the shoulder, the *enata* or man. Whether these motives originated as wood carving patterns or as body decoration and in which direction the transfer and adaption was made it is impossible to say definitely.

Several interesting possibilities are suggested by an analysis of the various motives called *kea* today. It would appear that the *kea* of common occurrence on wood is really a conventionalization of the *honu kea* or woodlouse with its six legs and two antennae. This was seen but once in tattooing, on the wrist of an old woman of Fatu Hiva (Pl. vii, *A*, *i*, *a*) and was drawn by an artist of Fatu Hiva as a former unit there (Pl. xvi, *K*). On the other hand, the usual body *kea* (Pl. xxii, *B*, *b* center) may very well be a simple conventionalization of one of the carved tortoise-shell plaques of the *pakea* or crown—a carved product of Hiva Oa—the motive having been borrowed from shell rather than from wood carving. There is a motive found today in tattooing on Ua Pou (Pl. xx, *A*, *e*; xxi, *D*, *b*) and depicted also as an early Fatu Hiva unit (Pl. ix, *A*, *b*) which resembles the *e honu*, tortoise, drawn by Langsdorff, and this, which has disappeared from Hiva Oa tattooing, may perhaps be said

to be the only conventional derivative of a naturalistic portrayal of the tortoise and probably the only pure body motive among the variants called *kea*. The southeastern carving motive is the *kea* which prevails today.

Another usual conventional motive appearing both in carving and tattooing, the *mata hoata*, or brilliant eye (Pl. xxvi, A, e), would appear to have originated in neither, being, in its simplest form, a copy of the eyes, ears and nostrils of a *tiki* or image face. Only on wood is this simple copy found today, and on wood we find all the transition stages of its development to the highly conventionalized unit common in tattooing today; whence it would appear that the *mata hoata* originated in sculpture, was copied upon wood, and transferred to the body, where it gradually was elaborated and more highly conventionalized. (For development see Pl. xxx, b, which is found only on wood today; xi, A, c; xviii, b; xxxiv, b; xxxiii, c; xxiii, B, f, a; xxiii, A, a, center.)

Of conventional motives the *ka'ake* is perhaps the most widely used. Dordillon gives *kakekake* as one of the words used to designate tattooing which is entirely finished. He spells the word "kake," but it seems better to adopt the spelling "ka'ake" for the following reasons: The distinguishing feature of the motive is its never varying curve which seems to correspond to the line of the under-arm curve or arm-pit for which the native term is *ka'ake*. The assumption that this curve of the body originally gave the name to the motive is borne out by several lines of reasoning. In the first place, Langsdorff assigns the placing of this motive originally to the inside arm and ribs (10, p. xv); in the second place, we have described for us this simple under-arm curve as its earliest form (Pl. xxix, h; xxx, i); and in the third place, the elaborations of this curve, as the motive grew in complexity, are representations of the *enata* or man with upraised arms (Pl. vi, B, center bottom), and of the *poka'a* (Pl. ix, B at base of fingers) or curved wooden object placed on the shoulders on which to rest a pole in carrying a heavy load. The association of ideas seems obvious and we find them associated today as minor decorations in the under-arm pattern (Pl. xiii, B, a, b; xiii, C, c and d; xiv, A). This combination is especially marked in the simpler forms of the *ka'ake* as found on Ua Pou (Pl. xx, B, b) and Nuka Hiva (Pl. xv, a). Although this unit appears upon wood, it seems reasonable to suggest that it was originally a body pattern.

There are certain body motives which seem never or rarely to have been used upon wood, such as the *huetai* (Pl. xxxiv, e) and the *po'i'i* (Pl. xxxiii, e; xxvi, A, d, center), which are associated with early Nuku Hiva, not Hiva Oa, art; and there are some which are just beginning to be transferred to wood at the present time, as the *ipu'oto*, another unit

found in early Nuku Hiva design (Pl. xiii); but it seems impossible definitely to assign particular conventional motives to the one medium or the other. However, it may perhaps be stated that geometric elements did originate on wood, and that the influence of geometric adzing and carving appears in tattooing both in certain transferred elements and in a general conventionalization of the primitive naturalistic motives. Inasmuch as Fatu Hiva is known to be the carving center, we may further define the geometric influence as springing directly from wood-carvers of the southeastern group.

The use of solid patches may be traced with interest, as here again we find a different treatment in the two groups. Some modern informants describe the men of Nuku Hiva as formerly having half of the body entirely black (Pl. xii, B); one remembers seeing a man with solid-black legs; several testify that when a man was completely tattooed in design, if he could bear it, the spaces were gone over and filled in until all pattern was obliterated and he was completely black. In corroborating this custom in Nuku Hiva, Langsdorff says that he saw some old men who were punctured over and over to such a degree that the outlines of each separate figure were scarcely to be distinguished and the body had an almost negro-like appearance. (See also 14, p. 78; 8, p. 155; 17, p. 306; 1, p. 106.) There are no accounts of such a practice in the southeastern islands, and this seems to point to an aesthetic sense there, which was lacking in the northwest, for certainly people with sufficient artistic sense to originate these beautiful patterns would not have covered them afterwards and considered the results the "height of perfection in ornament," as did the *tuhuna* of Nuku Hiva, according to Langsdorff and the other early voyagers.

Desgraz, who was in Nuku Hiva at approximately the same time as Melville, when Hiva Oa tattooing was the vogue, describes the use there of black bands containing delicate figures. These are today the fundamentally distinguishing feature of the Hiva Oa type of body design as well as of the face pattern. On the other hand, both from descriptions of natives today and from examination of the tattooing of the only old man and old woman to be found, whose patterns were put on by Nuku Hiva *tuhuna*, the basic principle of the Nuku Hiva type seems to have been solid patches. Leg patterns for women found today fall into three distinct types: that of Nuku Hiva (Pls. xvii-xix), Ua Pou (Pls. xx-xxi), and Hiva Oa (Pls. xxii-xxviii). The first is distinguished by triangular patches of different sizes fitted together with half inch spaces between them, the only regularity of arrangement being their placing so as to form a straight line down the center front of the leg. Flamelike edges, inset teeth, and

geometric linings, with here and there a naturalistic unit, break up the heavy patches and add to their irregular and fancy appearance. Examination of the leg motives of this very *tapu* Nuku Hiva chiefess, who must have employed the best artist obtainable, provokes the suggestion that these insets were crude and inartistic attempts at a style from the southeast which had perhaps just been introduced into Nuku Hiva and with which the Nuku Hiva *tuhuna* was not acquainted or perhaps to which he was not equal. The second type, that of Ua Pou, is put on below the knee only, in horizontal bands of delicately lined patterns, the motives on either side of the center, front and back, being exactly alike. The whole may be conceived of in front and back longitudinal sections of symmetrical halves, which meet in the middle of either side of the leg. Naturalistic, geometric and conventional treatments are all present. The third type, that of Hiva Oa, which was the prevalent style at the time of the discontinuance of the art, is similar in arrangement to that of Ua Pou, extending however high up onto the thigh, and presents a mean between the two former in heaviness of treatment, the fine lines swelling into black curves. The mode is almost purely conventional. The two latter may be characterized as curvilinear; the former, as angular in design.

The leg patterns to be seen on living men fall into two types, a single example representing that of Nuku Hiva (Pl. xxxi), all the rest being of the Hiva Oa type (Pls. xxxii-xxxviii). The former is characterized by unadorned heavy patches, triangular and oblong in shape, fitted together obliquely with no plan of arrangement save the formation of a straight intersection down the front of the leg. Teeth are the only insets. The Hiva Oa examples show the style to be of horizontal bands extending around three quarters of the leg, the inside front quarter being filled with triangles in the Nuku Hiva style (Pl. xxxiv, e-j), indicating, perhaps, a borrowing from the heavy black patches of that group. The thigh band and the underknee band are always composed either of four triangles or of triangles and parallelograms with insets of teeth; but beyond this, this style is totally different from the Nuku Hiva example, variations of the same fine line motives used in Hiva Oa for women being set into *pahito* so that the heavy bands become merely a framework for them. The Nuku Hiva pattern drawn from life stands quite apart from that pictured by early navigators (10, pp. 117, 119; 16, Pl. 132) and described by a modern informant on Fatu Hiva (See Pl. xxix). It is a pity that no other living example of the work of a Nuku Hiva artist could be found, as it is unsafe to make any general statement about it.

At the present time, there is but one type of back decoration for men (Pl. xiv, C): eight heavy rectangular patches arranged in pairs along the

back bone with fine line insets and a girdle. These are called *peka tua*, back cross, by an informant of Nuku Hiva and may be an outgrowth of the cross on the back described by Langsdorff (10, p. 123), though the present mode bears no resemblance to a cross, being rather another example of band construction.

With the band construction of the present day, then, are associated exact technique, perfect symmetry, an evident understanding of anatomy and fitting of design to the body, and motives which are akin in name and formation to those carved on bowls, paddles, canoes, and similar objects. The distinguishing features accompanying the oblique patch type are irregularity, no sense of the design as a whole, no fitting of the motives to the body, naturalistic units, fussy, elaborate, non-aesthetic, fine-line insets.

A survey of these two types of body decoration leads naturally to the suggestion that there was a fundamental difference of concept between the two groups regarding the reason for its use. Plainly, there was an emphasis upon endurance and fortitude in the mind of the northwesterner when he braved the pain of a completely perforated skin; while the southeasterner looked upon the art as more purely decorative. Dordillon gives the word *ne'one'o* as meaning "what inspires horror (in speaking of a wound)," and "to cry a long time;" and this word with the addition of the phrase, "*i te tiki*" means "completely covered with tattooing." It is the pain of which the people of the Marquesas speak today when displaying their decorations, and it must be admitted that this is as true in the one group as in the other.

The only practical reason for tattooing that was suggested by living informants came from a man of Nuku Hiva, who, in describing an old mode of the northwestern group of tattooing half of the entire body solid black, accounts for this style by saying that such a one turned his black side towards the enemy during a battle, so that he could not be distinguished or recognized.

Inquiry into the naming of motives may throw some light upon their significance in the native mind. Appreciation of the anatomy of the body is often of such paramount importance as to give the name of the body part to the motive which is fitted to it, the *fatina* (joint) or knee jointure pattern (Pl. xxxiv, *f*) being a case in point. The same sense of body form is approached from a slightly different angle, as in the naming of the buttock pattern, *tifa* (cover) (Pl. xxxv, *c*), the convex of the body part resembling the cover of a calabash. Motives are sometimes referred to in purely technical terms of form: such as *paka* (Pl. xxxv, *h*) a splinter; *kopito* (Pl. xxiii, *A, d*, left and right) zigzag; or in terms of

the parts they play in the pattern as a whole, such as the *ka'ava* (Pl. x, B, 1, g); beam supporting the timbers of a house, which performs just this function in the hand pattern; or the *iti'iti'i* (Pl. xxvi, B, h) which encircles the leg, binding together the side motives.

Many of the design names⁴ then, are names given by artists in terms of their particular medium; but motives are also named for objects in nature or in the material culture, of which they were probably originally naturalistic copies. Prominent among these are the *enata* (Pl. xxiii, B, h) or man; the *nihoniho peata* (Pl. III, 6, c) or shark's teeth; the *hikuhiku atu* (Pl. xxxiv, k) or bonito tails; the *pakiei* (Pl. xx, B, f) or crab; the *fa'amana* (Pl. xvi, h) or pandanus branches; the *makamaka* (Pl. xx, A, c), branches; the *kaka'a* (Pl. xx, B, c), lizard; the *poka'a* (Pl. ix, B at base of fingers) or shoulder rest for a carrying pole, which is sometimes represented with the carrying pole in the socket as in the finger motives of Pl. ix, C, 1.

A third department of names seems to relate to legends and beliefs; such being the *vai o Kena* (Pl. xxvi, A, g, center) water of Kena; the *vai ta keetu* (Pl. xvi, c), sacred bathing place of chiefs; the *vai me'ama* (Pl. xx, A, d), water moon; the *Pohu* (Pl. xxii, B, g, center), a legendary hero; the *peke'oumei* and the *fanaua* (Pl. xv, c), or evil spirits.

Whether these and the naturalistic motives had magical significance is not known today, though there is reason to believe that the *fanaua* were put upon the back of this one woman to protect her from these evil spirits. The only positive statement regarding the significance of tattooing design in the Marquesas that can be made upon the basis of the data available today is that it was considered purely decorative at the time of the cessation of the practice of the art. And it is as pure design that it should be studied and appreciated.

⁴ In the explanation of the plates the names of the motives are those given by the persons on whose bodies they are found. It is impossible to secure accurate translations of the majority of design names from natives today, since these have become simply names to them. The names given here are only those which a knowledge of the language and information from natives and from Dordillon seem to make reliable.

TRANSLATIONS OF DESIGN NAMES

aa fanaua	row of evil spirits (of a certain kind)	paka oto	inside places
akaaka fa'a	pandanus roots	pakiei	crab
enata	man	pana'o	cut in small slices, traced
fa'a mana	pandanus branches	papua	enclosure or gar- den
fanaua	a kind of evil spirit	papua au ti	enclosure of ti leaves
fatina	jointure	papua enata	native enclosure
hei ta'avaha	a diadem of cock's plumes	peata	shark
hei po'i'i	shellfish (of a cer- tain circular kind) wreath	peka tua	back cross
hikuhiku atu	tails of the bonito fish	peke ou mei	a kind of evil spirit
honu	tortoise	pia'o tiu	to fold or make into bundles
hue ao	calabash bottom	Pohu	a legendary char- acter
hue epo	dirty calabash	po'i'i	a kind of coiled shell fish
hue tai	compass	poka'a	a shaped wooden shoulder
ihu epo	dirty nose	pu	rest for a carrying pole
ikeike	a kind of shrub	puaina, puasinga	conch shell
ipu ani	sky bowl	pua hitu	ear
ipu ao	bowl bottom	pua hue	flower of olden times
ipu oto	inside the bowl	puha puaka	flower calabash
iti'iti'i	binding	puto'o	pig's thigh
ka'ake	armpit	tamau	buttocks
ka'ava	ridge pole	tapu vae	ring
kaka'a	lizard	ti'ati'a pu	sacred foot
kea	woodlouse, or tor- toise or a carved plaque of tortoise shell	tifa	to encircle several times
kikipu	lips	tiki	cover
kikomata	eyes	tiki ae	image
kikutu	lips	tou pae	forehead image
kohe ta	sword	tumu ima	three head orna- ments
kohe tua	back knife	vahana ae	hand tree
kopiko	zigzag	vai me'ama	half a forehead
koua'ehi	coconut leaves	vai o Kena	water moon
makamaka	branches	vai ta keetu	water of Kena, a legendary hero
mata	eyes	veo	sacred bathing place of chiefs
mata hoata	brilliant eye	vi'i po'i'i	tail
niho or nihoniho	teeth		to turn the shell fish
nihoniho peata	shark's teeth		
nutu kaha	mouth or muzzle		
omuo puaina	a kind of carved bone earring		
pahito	ancient patch		
paka	splinter		

BIBLIOGRAPHY

1. BERCHEON, Le tatouage aux Iles Marquises: Bull. Soc. d'Anthr., vol. 1, pp. 99-117, Paris, 1860.
2. CHAULET, PIERRE, Manuscript in possession of the Catholic Mission in the Marquesas.
3. DORDILLON, I. R., Grammaire et dictionnaire de la langue des Iles Marquises, Paris, 1904.
4. FORSTER, G., A Voyage round the World: vol. 2, London, 1777.
5. FORSTER, J. R., Observations made during a voyage round the World, London, 1778.
6. GARCIA [GRACIA?], MATHIAS, Le P., Letters sur les Iles Marquises: Paris, 1843.
7. JARDIN, Edéléstant, Essai sur l'histoire naturelle de l'archipel des Marquises, Paris et Cherbourg, 1862.
8. KRUSENSTERN, A. J. von, Voyage round the world in the years 1803, 1804, 1805, and 1806, vol. 1, translated from the original German by Richard Belgrave Hoppner, London, 1813.
9. LACASSAGNE, A., Les Tatouages, étude anthropologique et médico-légale: Paris 1881.
10. LANGSDORFF, G. H. von, Voyages and travels in various parts of the world during the years 1803, 1804, 1805, 1806, and 1807, London, 1813.
11. MARCHAND, ETIENNE, Voyage autour du Monde pendant les années 1790, 1791 et 1792, vol. 1, Paris an VI-VIII [6th to 8th years of the Republic—1797-1800].
12. MELVILLE, HERMAN, Omoo, a narrative of adventure in the South Seas: New York, 1863.
13. MELVILLE, HERMAN, Typee, A peep at Polynesian life during a four months' residence in a valley of the Marquesas, New York, 1876.
14. PORTER, DAVID, A voyage in the South Seas, London, 1823.
15. QUIROS, PEDRO FERNANDEZ de, The Voyages of Pedro Fernandez de Quiros, 1595 to 1606: Hakluyt Soc., 2nd ser., vols. 14, 15, translated and edited by Sir Clements Markham, London, 1904.
16. RIENZI, M. G. L. Domeny de, Océanie ou cinquième partie du Monde, vol. 2, Paris, 1863.
17. STEWART, C. S., A visit to the South Seas in the U. S. Ship Vincennes during the years 1829 and 1830, vol. 1, New York, 1831.
18. VINCENDON-DUMOULIN and DESGRAZ, C., Iles Marquises ou Nouka-Hiva, histoire, géographie, moeurs, Paris, 1843.

EXPLANATION OF PLATES

(From drawings by the author except where otherwise indicated.)

PLATE I.—PHOTOGRAPHS OF A TATTOOED MAN OF THE MARQUESAS.

The patterns on half the body of Eotafa of Ta'a Oa, Hiva Oa—the most fully tattooed man seen in the Marquesas by the author—the motives being brought out by painting them with black paint. Identical patterns on the unpainted half of the man's body do not appear in the photograph.

PLATE II.—PHOTOGRAPHS OF A TATTOOED WOMAN OF THE MARQUESAS.

Typical modern patterns for women, on the body of Tuuakena at Atu Ona, Hiva Oa: *A*. Front and side view of face, showing lip and ear patterns. *B-E*. Front and rear views of legs showing patterns on the painted portions.

PLATE III.—FACE PATTERNS FOR MEN.

Examples of the Hiva Oa style of three horizontal face bands, *ti'a ti'a pu*: 1. An unfinished example from Pua Ma'u, Hiva Oa.—2. From Haka Hetau, Ua Pou, showing *enata* motive (*a*).—3. From Haka Hetau, Ua Pou, showing a half band on the forehead.—4. From Hokatu, Ua Huka, showing the motives *tiki ae* (*a*), *kikomata* (*b*), *tiki pu* (*c*), and *pariho* (inset in *c*).—5. From Pua Ma'u, Hiva Oa, showing a band over one eye, *mata* (*a*), and a mouth band, *nutu kaha* (*b*).—6. From Vai Paee, Ua Huka, showing the motives *vahana ae* (*a*), *mata* (*b*), *nihoniho peata* (*c* left), name unknown (*c*, right), detail of *c* right (*e*), and the *kikutu* (*d*).—7. From Vai Paee, Ua Huka.—8. From Hane, Ua Huka.

PLATE IV.—FACE PATTERNS FOR MEN.

Examples of the Hiva Oa style of three horizontal face bands, *ti'ati'a pu*: 1. From Omoa, Fatu Hiva.—2. From Hanavava, Fatu Hiva, showing on inter-band the *nihoniho peata* motive.—3. From Hatihau, Nuku Hiva (after a sketch by E. S. Handy).—4. From A'akapa, Nuku Hiva (after a sketch by E. S. Handy).—5. From Hana Vave, Fatu Hiva, showing detail of a chainlike design (*a*).—6. From Hana Vave, Fatu Hiva, the three bands here called as a whole *tou pae*.—7. From Haka Hetau, Ua Pou, showing *mata* (*a*), *veo* (*b*), *kiki pu* (*c*), *enata* (*d*), detail of *b* (*e*), detail of *d* (*f*).—8. From Hooumi, Nuku Hiva (after a sketch by E. S. Handy).—9. From Haapa, Nuku Hiva (after a sketch by E. S. Handy).—10 and 11. From Haka Hau, Ua Pou.

PLATE V.—FACE AND HEAD PATTERNS FOR MEN.

Examples of various styles of different periods: 1. From Hana Iapa, Hiva Oa, showing an unusually shaped eye band and an unfinished mouth band.—2. From Atu Ona, Hiva Oa, showing shoulder and chest patterns mounting the neck to join the face bands.—3. From Haka Hau, Ua Pou: an unfinished pattern, showing the probable sequence of execution—one eye being allowed to heal while half of the mouth was done, and so on.—4. From Ha'a Kuti, Ua Pou (after a sketch by E. S. Handy).—5. From Tai o Hae, Nuku Hiva, one of two extant examples showing the Nuku Hiva style of an oblique band (*pa heke*) crossing the face.—6. A former Hiva Oa pattern (after a description by an Atuona informant).—7. An old pattern for warriors of all the islands (after a description by an informant of Fatu Hiva).—8. A variant of the *ti'ati'a pu*, with nostrils covered, belonging to Fatu Hiva and called *ihu epo* (after a sketch by E. S. Handy).—9. A pattern formerly used on the crown of the head (after a painting on a sculptured figure which once served as a house post in Ta'a Oa, Hiva Oa, and is now in possession of M. Chadourne of Papeete, Tahiti).—10. The *hue epo* pattern, an example of a former style of the people of Tai o Hae, Nuku Hiva (after a description by a Nuku Hiva informant).—11. An old Nuku Hiva pattern (after a description by an informant of Fatu Hiva).

PLATE VI.—HEAD AND SHOULDER PATTERNS FOR WOMEN.

- A. Typical face patterns for women: lip marks, *koniho*, and an ear pattern, *omua puaina*.
- B. A band across the arm just below the fall of the shoulder, on a woman of Tai-pi Vai, Nuku Hiva (after a sketch by E. S. Handy).
- C. Ear patterns: 1. On a woman of Hakaui, Nuku Hiva.—2. Of Atu Ona, Hiva Oa, showing the *omuo puaina* design around the lobe and the *kea* design at the back of the ear.—3. Of Tai-pi Vai, showing the *puaina* design (after a sketch by E. S. Handy).—4. Of Pua Ma'u, Hiva Oa, showing around the lobe the *aniatiu* (*anihaupcka*, Dordillon) motive and back of the ear the *po'opito ua puaina*.—5. Of Hiva Oa.—6. A woman's pattern on a man of Pua Ma'u, Hiva Oa—a rare occurrence.

PLATE VII.—HAND PATTERNS. MOTIVES FROM FATU HIVA AND TAHU ATA.

- A. On a woman of Fatu Hiva: 1. The back of the hand.—2. The palm, showing the *pariho* motive on the underwrist around the palm, the *mata* (a), the *tamau* (b), and the *pariho* (c).
- B. On a woman of Tahu Ata: 1. The back, showing the *poka'a* motive at the base of the middle finger, the *pihau* (*tumu ima*, Langsdorff) (a) and the *mata* (b).—2. The underwrist

PLATE VIII.—HAND PATTERNS. MOTIVES FROM NUKU HIVA AND HIVA OA.

- A. On a man of Nuku Hiva.
- B. On a woman of Hiva Oa, showing the *taina vau* motive between the thumb and index finger, *e tua poou* (a), *ti'i kao* (b), and the *paa niho* (c) around the palm.

PLATE IX.—HAND PATTERNS. MOTIVES FROM FATU HIVA AND TAHU ATA.

- A. An old pattern of Fatu Hiva called *kohi'u* (after a drawing made by an old *tuhana* of Fatu Hiva), showing finger motives, *mata va'u*; finger and upper hand units inclusive, *nutu kaha*; *po'i'i* (a); *kea po'i'i* (b); *hei po'i'i* (c) and *hei ta'avaha* (d) around the palm.
- B. On the left hand of a woman of Tahu Ata (for the design on her right hand see Plate X, A), showing the *poka'a* motive at the base of the fingers; the *po'i'i* (a), *Pohu* (b), and the *eia va'u* (c).
- C. On a woman of Hiva Oa, done by a *tuhuna* of Fatu Hiva: 1. The back of the hand showing the central oval, the *po'i'i* motive; the *poka'a* at the base of the fingers and the thumb; *matua hee moa* (a), *ama opea* between the thumb and index finger; and the *fanaua* (b, c).—2. The palm showing the *fanaua* motive around the palm, the *po'i'i* (a), and the *piaotiu* (b).

PLATE X.—HAND PATTERNS. MOTIVES FROM TAHU ATA.

- A. On a woman of Tahu Ata: 1. The back of the hand, showing the *ka'ava* motive at the base of the middle finger to the wrist, *kou'u* (a), *poka'a* (b), *mohovaha* (c), and the *mata* (d).—2. The underwrist, *koua'ehi* (a).
- B. On a woman of Tahu Ata. (The tattooing was done by the same *tuhuna* whose work is shown in Plates X, A and IX, B.) 1. The back, showing the motives *papua* (a), *e tua poou* (b), *paku* (c), *ka'ava* (center), *fanaua* (e), *Pohu* (f), and *ka'ake* (g).—2 Underwrist, showing the motives *paa niho* around the palm; *papua au ti* (b), and the *vai o Kena* (c).

PLATE XI.—HAND PATTERNS. VARIANT MOTIVES.

- A. Principal units on the hand of a woman of Nuku Hiva, showing the motives *mata putona* (a), *kea* (b), and the *mata io* (c). (After a sketch by E. S. Handy.)
- B. A representation of a bird on the underwrist of a woman of Nuku Hiva.

- C. Pattern on two men of Ua Pou.
- D. On a man of Hiva Oa, tattooing done by a *tuhuna* of Fatu Hiva (after a sketch by E. S. Handy).
- E. On the underwrist of a woman of Hiva Oa, an unusual *kea* motive.

PLATE XII.—ARM AND BREAST PATTERNS FOR MEN. EVOLUTIONARY TYPES.

- A. An old style of Fatu Hiva (after a drawing by a *tuhuna* of Fatu Hiva) showing breast stripes, *ti'i heke*.
- B. An old style of Nuku Hiva (after a sketch by E. S. Handy from the description of an artist of Fatu Hiva).
- C. Detailed drawing of A, showing the motives *kea* (a), the *etua pooli* (b), the *poka'a* or *pahito* (c), *fa'amana* (d), *ipu ao* (e), and the *vi'i po'i'i* (d and e).
- D. The present style: under-arm, *ipu oto*; shoulder disk, *puha puaka*; chest, *ka mo'ehu*.
- E. Detailed drawings of B showing the motives *nihonihio* (a), *po'i'i* (b, c).

PLATE XIII.—ARM PATTERNS FOR MEN. TYPICAL MODERN MOTIVES, *ipu oto*.

- A. On a man of Ua Huka.
- B. On three men of Ua Pou showing a variant of the armpit motive, the *poka'a* (a), and the *enata* (b). Three pairs of squarish ovals, similar to those in A complete this arm pattern.
- C. On a man of Fatu Hiva showing the motives *puaina* (a); *ti'i o'oka* (b); the three pairs of ovals, *ipu oto*; the arm-pit unit, *ipu ao*; *poka'a* (c); and *enata* (d).

PLATE XIV.—BODY PATTERNS FOR MEN. OLD AND NEW TYPES.

- A. An unfinished example from Nuku Hiva, typical of all islands at the present time, showing the arm-pit design, *ipu katu* and chest, *teeva*.
- B. An old style in back and side patterns from Fatu Hiva (after a drawing by a *tuhuna* of Fatu Hiva) showing back patches, *pahito*; *ipu oto* (a); *pahito* (b); *mata* (c); *mata* (d); *kohe tua* (e), a girdle and leg stripe.
- C. An unfinished back pattern, *peka tua*, from Nuku Hiva but common to all the Marquesas islands. On Ua Pou this pattern is called *moho*.

PLATE XV.—A BACK PATTERN FOR WOMEN.

A girdle on a chiefess of Nuku Hiva, showing the motives *ka'ake* (a), *mata* (b), and *fanaua* (c).

PLATE XVI.—LEG MOTIVES FOR WOMEN.

Motives formerly used in Fatu Hiva: *koniho* (a), *mata hoata* (b), *vai ta keetu* (c), *pana'o* (d), *ikeike* (e), *hei po'i'i* (f), *akaaka fa'a* (g), *fa'a mana* (h) worn on the inner ankle, *mata omo'e* (i) worn on the inside of the knee, like the present *pahito*, *puha tahi* (j) worn below the knee on the inside of the leg, *eia va'u* (k) worn on the inside of the calf, *nutu kaha* (l), *tava* (m) worn on the inside of the leg above the ankle (after drawings by a *tuhuna* of Fatu Hiva).

PLATE XVII.—A LEG PATTERN FOR WOMEN.

The only surviving example, so far as known, of an old style of Nuku Hiva.

- A. Front and side views of the left leg.
- B. Back and side views of the right leg.

PLATE XVIII.—A LEG PATTERN FOR WOMEN.

Detail of the motives shown in Plate XVII, A.

PLATE XIX.—DETAILED STUDIES OF A LEG PATTERN FOR WOMEN.

- A. Of motives in Plate XVII, B.
- B. Back thigh units of both legs of patterns in Plate XVII.
- C. Ankle motives of the right leg of pattern in Plate XVII, the rest of the ankle and foot pattern being identical with those of the left.

PLATE XX.—A LEG PATTERN FOR WOMEN.

Detail of the right leg motives of an old style of Ua Pou, the only surviving example to be found today.

- A. Front: *paka* (a), *mata io* (b), *makamaka* (c), *vai me'ama* (d), *honu* (e).
- B. Back: *po'i'i* (a), *ka'ake* (b), *kaka'a* (c), *mata io* (d), *vai me'ama* (e), *pakiei* (f), *pu* (g).

PLATE XXI.—A LEG PATTERN FOR WOMEN.

Detail of the left leg motives of the preceding example:

- A. Front, knee to ankle: *mata* (a), *ka'ake* (b), *pakiei* (c), *vai me'ama* (d).
- B. Back, knee to ankle: *ka'ake* (a), *mata io* (b), *vai me'ama* (c).
- C. General view of the left leg.
- D. Ankle band.

E. General view of the right leg, of which detail is shown in Plate XX.

PLATE XXII.—A LEG PATTERN FOR WOMEN. THE MODERN TYPE.

Typical motives indicating the color of the tattooing as it appears on the skin.

- A. Back pattern: *vai pahu* (a, left), *ka'ake* (a, center), *mata hoata* (b), *ka'ake* (c), *mata hoata* (d), *ipu ani* (e), *vai o Kena* (f), *mata hoata* (g), *ka'ake* (h) and (j), *Pohu* (i), *ipu ani* (k, center), *ka'ake* (k, left and right).
- B. Front pattern: *mata hoata* (a), *po'okohé* (b, left and right), *kea* (b, center), *ka'ake* (c, left and right), *pahito* (d, left and right), *ipu ani* (d, center), *mata mei nei* (e), *ka'ake* (f, left and right), *vai o Kena*, sometimes called *potia hue* or *peke ou mei* (f, center), *Pohu* (g, center), *mata hoata* (h), *pahito* (i and j, left and right), *ka'ake* (i and j, center), *ipu ani* (k), *mata hoata* (l), *etua poou*, sometimes *Pohu* (m).

PLATE XXIII.—A LEG PATTERN FOR WOMEN. A VARIANT ARRANGEMENT ON A WOMAN OF PUĀ MA'U, HIVA OA.

- A. Front pattern: *ka'ake* (a, left and right), *mata hoata* (a, center), *aniatiu* (b, left and right), *ka'ake* (b, center), *kopiko* (d, left and right), *po'i'i* (d, center), *ka'ake* (e, left and right), *mata hoata* (f, center), *ka'ake* (g), *etua poou* (h), *mata hoata* (i), *pahito* (j, left and right), *pahito* (k, left and right), *ka'ake* (j and k, center), *po'i'i* (l), *mata hoata* (m).
- B. Back pattern: *mata hoata* (a), *ka'ake* (b), *mata hoata* (c), *po'i'i* (d), *ka'ake* (e), *mata hoata* (f), *ka'ake* (g), *paa niho* (h, around the foot).

PLATE XXIV.—LEG MOTIVES FOR WOMEN.

A and C. Detail of upper thigh motives omitted from the leg but burned instead upon bamboo.

B. A general view showing how the motives in Plate XXIII are arranged on the leg.

PLATE XXV.—A LEG PATTERN FOR WOMEN.

Front and rear views of an elaborate leg pattern from Pau Ma'u, showing a combination of the fine motives and heavy patches usually worn by men.

PLATE XXVI.—A LEG PATTERN FOR WOMEN.

- A. Detailed study of the motives in the front pattern of Plate XXV: *nutu kaho* (a-c inclusive), *kea* (a, center), *ka'ake* (b), *kea* (c, center), *pahito* (d, left

and right), *po'i'i* (*d*, center), *mata hoata* (*e*), *tu'u po'o*, sometimes *vai o Kena* on Fatu Hiva (*f*), *vai o Kena* (*g*, center), *ka'ake* (*g*, left and right), *mata hoata* (*h*), *pahito* (*i* and *j*, left and right), *ka'ake* and *peke ou mei* (*i* and *j*, center), *po'i'i* (*k*), *mata hoata* (*l*), *tu'u po'o* (*m*).

- B. Back pattern: *oniho* (*a*), *paka* (*b*), *pahito* (*c*), *papua* (*d*), *pahito* (*e*), *mata hoata* (*f*), *po'i'i* (*g*), *iti'iti'i* (*h*), *mata hoata* (*i*), *ka'ake* (*j* and *l*), *peke ou mei* (*k*), *ka'ake* (*m*, left and right), *po'i'i* (*m*, center).

PLATE XXVII.—LEG MOTIVES FOR WOMEN. VARIANTS.

- A, B, and C.* *Nutu kaha*, variations of the thigh pattern.
D. A band encircling the ankle of a woman of Nuku Hiva.
E. A band encircling the ankle of a woman of Tahu Ata.
F. *Oniho*, a band outlining the sole of the foot of a woman of Ua Huka.

PLATE XXVIII.—LEG MOTIVES FOR WOMEN. OTHER VARIATIONS.

- A.* An elaborate *po'i'i* on the knee of a woman of Tahu Ata.
B. A front shin pattern of unusual arrangement and combination.
 [Note the use of the *vai o Kena* on its side (*a*, center), and the combination of *mata* and *vai o Kena* (*b*).]
C. A variant of the *aniatiu* of Plate XXIII, *A*: left and right (*b* and *c*).
D. Crude representations of the *pa'a'oa* (fish) found on the knees of a woman of Tahu Ata.
E. An upper thigh motive, *puhi*, on a woman of Tahu Ata.
F. An unusual extension of the *ka'ake* (*a*), a variant of Plate XXIII, *A, h*, found on a woman of Ua Huna; a binding motive (*b*) from Ua Huka, a variant of the *iti'iti'i* of Plate XXVI, *B, h*.

PLATE XXIX.—LEG MOTIVES FOR MEN.

Motives formerly used in Nuku Hiva: the *kohe ta*, or sword motive, consisting of a girdle across the back and a stripe down the side of the leg (*a, b*), *hikuhiku atu* (*b*), *pua hitu* (*c*), *pahito* (*d*), *huetai* (*e*), *po'i'i* (*f*), *mata hoata* (*g*), and the *ka'ake* (*h*). (After drawings by an artist of Fatu Hiva).

PLATE XXX.—LEG MOTIVES FOR MEN.

Motives formerly used in Fatu Hiva (after drawings by a *tuhuna* of Fatu Hiva): *aa fanaua*, worn on the upper front thigh (*a*); *mata hoata* (*b*); *pahito* (*c*), *vai o Kena* (*b* and *c*), worn on the back of the leg below the bend of the knee; *papua enata* (*d*), worn on the inside calf just above the ankle; *mata hoata* (*e*), worn on the upper thigh alongside the *aa fanaua*; *ti'i hochoe* (*f*), worn on the bend of the knee; *paka'a* (*g*), worn on the back of the calf; *nihonihio* (*h*), worn on the inside calf; *ka'ake* (*i*), *pua hue* and *ikeike* (*j*); *pia'o tiu* (*k*), worn around the ankle; *ti'i kakao* (*l*), worn on the foot.

PLATE XXXI.—A LEG PATTERN FOR MEN.

The Nuku Hiva style of leg pattern, done by a *tuhuna* of Nuku Hiva and found on only one man: ornamental band on the thigh, *puhi puha*; the heavy patches, *pai-pai io*.

PLATE XXXII.—LEG PATTERNS FOR MEN.

The Hiva Oa style, in vogue on all the islands at the time of the discontinuance of the art:

- A.* Side view of a leg with motives from Ua Huka. The buttock and inside front quarter of the leg pattern are lacking, as is usual in modern examples.
B. Front and side views of a leg with motives from Fatu Hiva, the inside front quarter of the leg pattern, below the knee, being present.

C. Back view of a leg with motives from Ua Pou, the buttock pattern being present.

PLATE XXXIII.—A LEG PATTERN FOR MEN.

Detailed study of Plate XXXII, A: *kohe ta* (a, b, and c), *kea* (b), *mata io* (c), *puto'o* (d), *kautupa* (e), *fatina* (f), *pahito* with *po'i'i* inset (g), *hikuhiku atu* (h), *pahito* (i and j), *auhoi* (k), *tapu vae* (k and l).

PLATE XXXIV.—A LEG PATTERN FOR MEN.

Detailed study of motives on Plate XXXII, B: *kohe ta* (a and b); *puto'o* (c); *pahito* with *mata hoata*, *ka'ake*, and *tiki* insets (d); *mata vaho*, the half oval; *pua hue* (e); *fatina* (f); *pahito* with *po'i'i* and *ka'ake* insets (g); *paka oto* (h, i, j); *hikuhiku atu* (k); *pahito*, with *mata* and *ka'ake* insets (l), *tapu vae* (m).

PLATE XXXV.—A LEG PATTERN FOR MEN.

A detailed study of the motives of Plate XXXII, C: *kohe ta* (a and b); *tifa* (c), containing a *mata hoata*, *enata*, and a *kea* in the center at the bottom; *puto'o* (d); *pahito* (e); *fatina* with elaborate double rows of cross-barred teeth inset (f); *pahito* (g); *paka* (h), in place of the usual *hikuhiku atu*; *pahito* (i); *tapu vae* (j); *auhoi* (k).

PLATE XXXVI.—A LEG PATTERN FOR MEN.

An elaborated pattern of the Hiva Oa style found at Ua Huka: *kohe time* (a-c), complicated by two *mata io* (b and c), *puto'o*, lightened by a *mata io* inset (d), *pahito* broken by a *ka'ake* and a *po'i'i* inset (f).

PLATE XXXVII.—A LEG PATTERN FOR MEN.

A more complicated pattern from Hiva Oa, rendered almost as lacelike as those for women by the numerous fine-line insets in the heavy patches: *puto'o* (a, b, c,) with insets of cross-barred teeth, double rows of *tiki*, and a *vai o Kena*; *pahito* with *mata hoata*, *ka'ake*, and *po'i'i* insets (d); *fatina* with *mata* inset (e); *pahito* with *po'i'i* and *ka'ake* insets (f); *hikuhiku atu* (g) with flourishes at the points; *pahito* (h), whose simple lines are almost lost in the elaborate insets of *vai o Kena* and *mata*.

PLATE XXXVIII.—LEG MOTIVES FOR MEN.

- A. *Kohe ta* from Fatu Hiva.
- B. A thigh pattern from Nuku Hiva (after a sketch by E. S. Handy): *mata* (a), *hue ao* (b).
- C. Two bands for the foot: *pia'otiu* and *kakao*.
- D. An inside knee motive, *mata vaho*, from Fatu Hiva.
- E. and F. Ankle bone decorations, *auhoi*.
- G. An ankle band from Fatu Hiva: *Tapu vae* (a); *hikuhiku atu* (b); *pahito* with *ka'ake*, *mata io*, and *tiki* insets (c).
- H. An elaborated *pahito* from Fatu Hiva with *ka'ake*, *enata*, and *mata io* insets.

TATTOO DESIGNS IN THE MARQUESAS



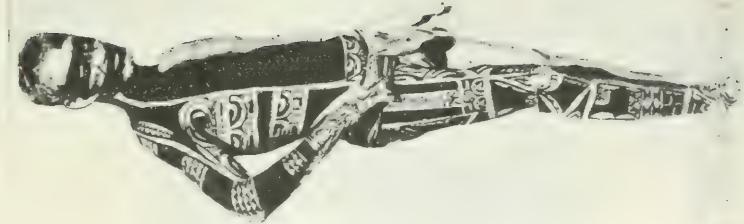
A



B



C



F

E

D





B

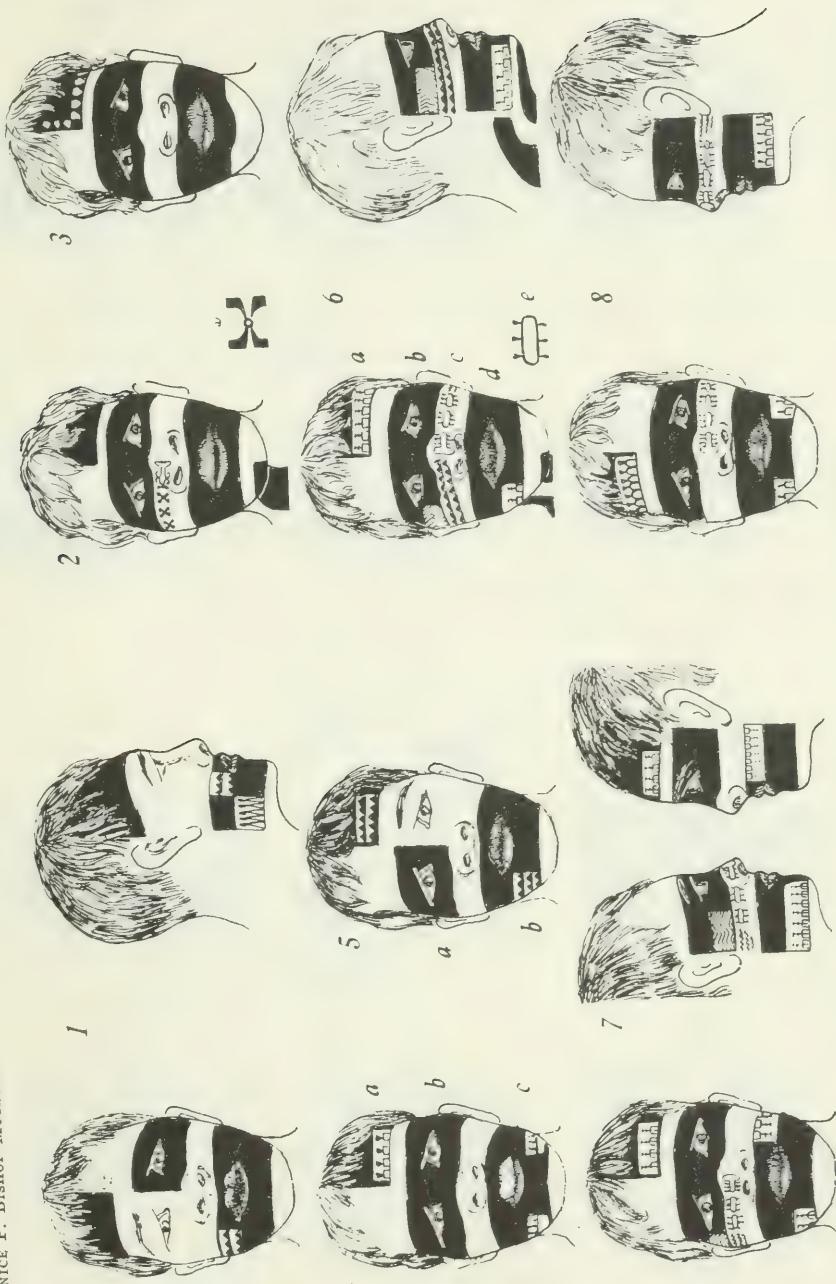
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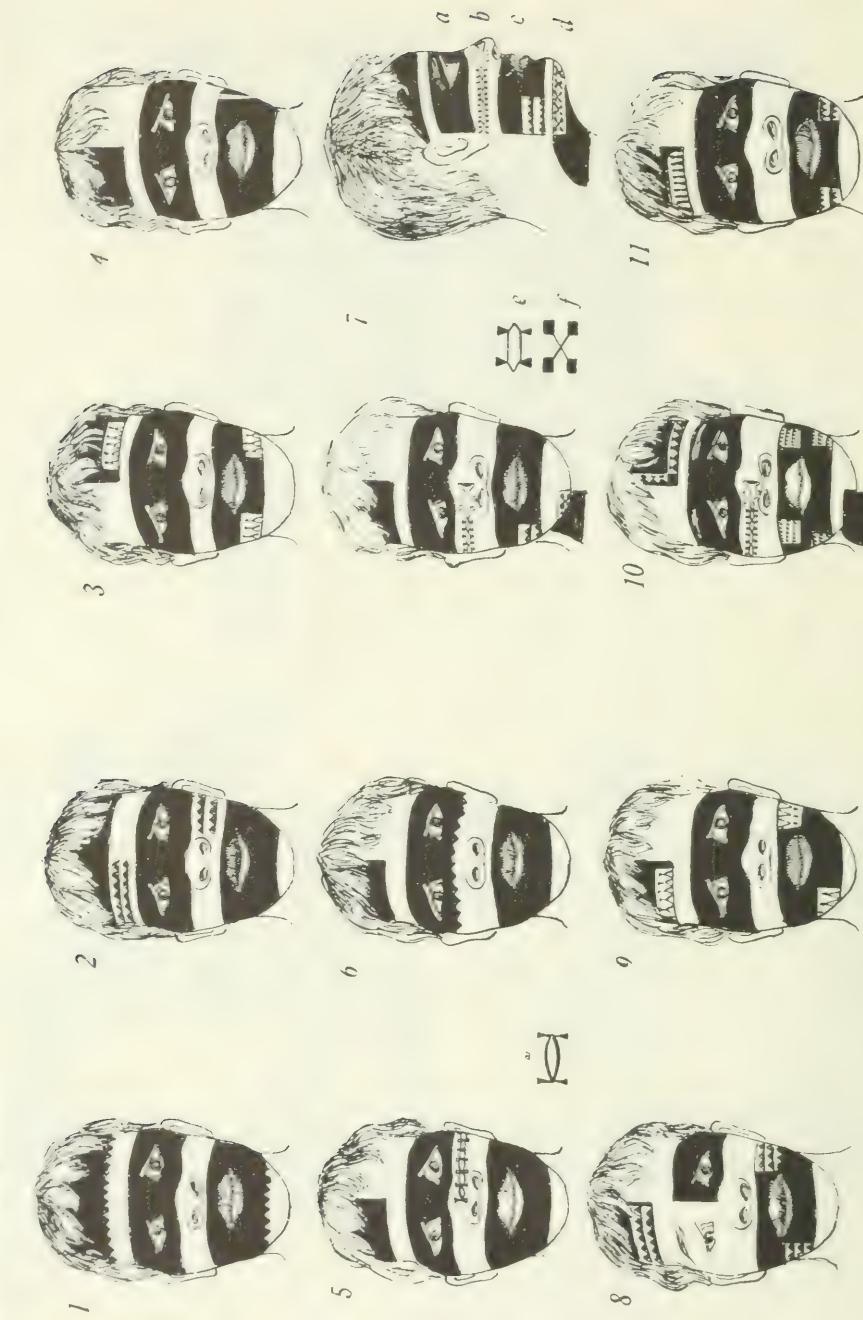
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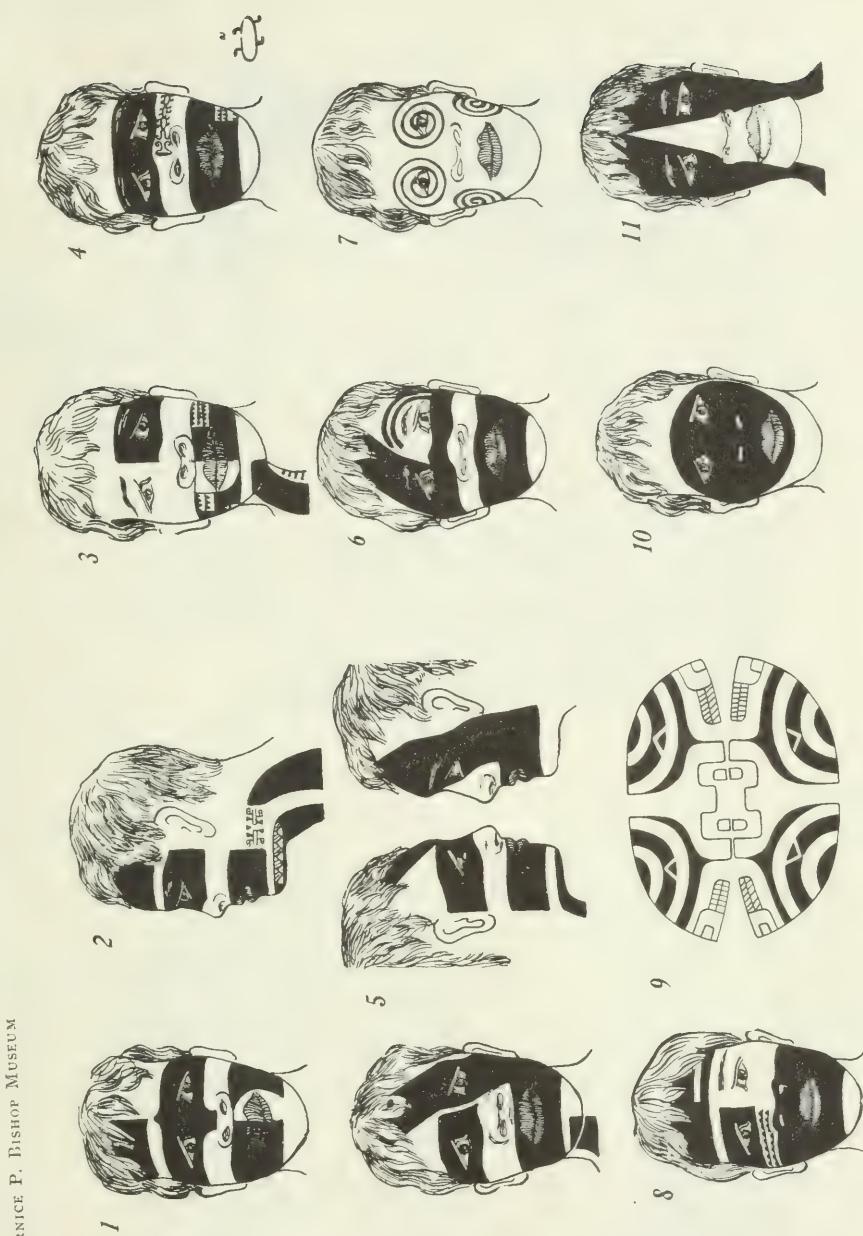
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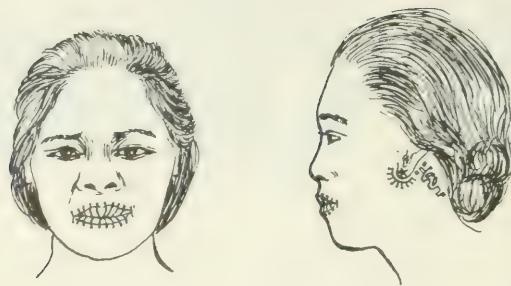
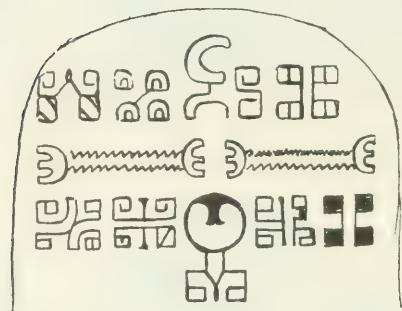
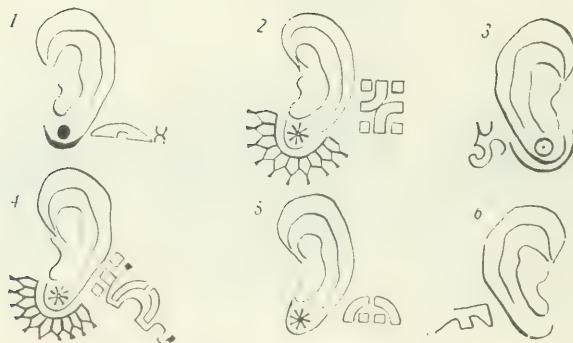
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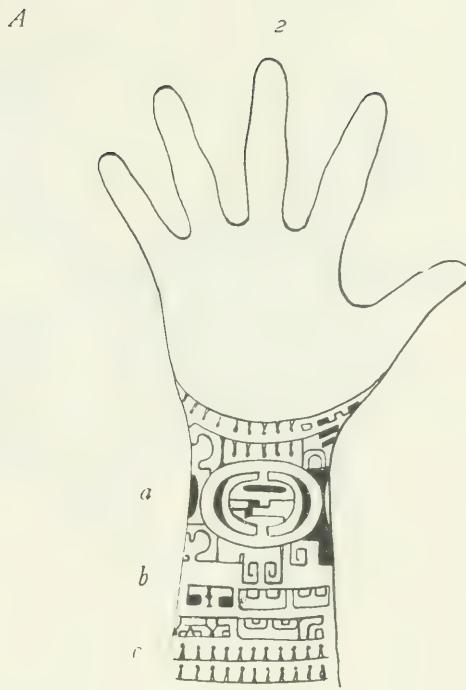
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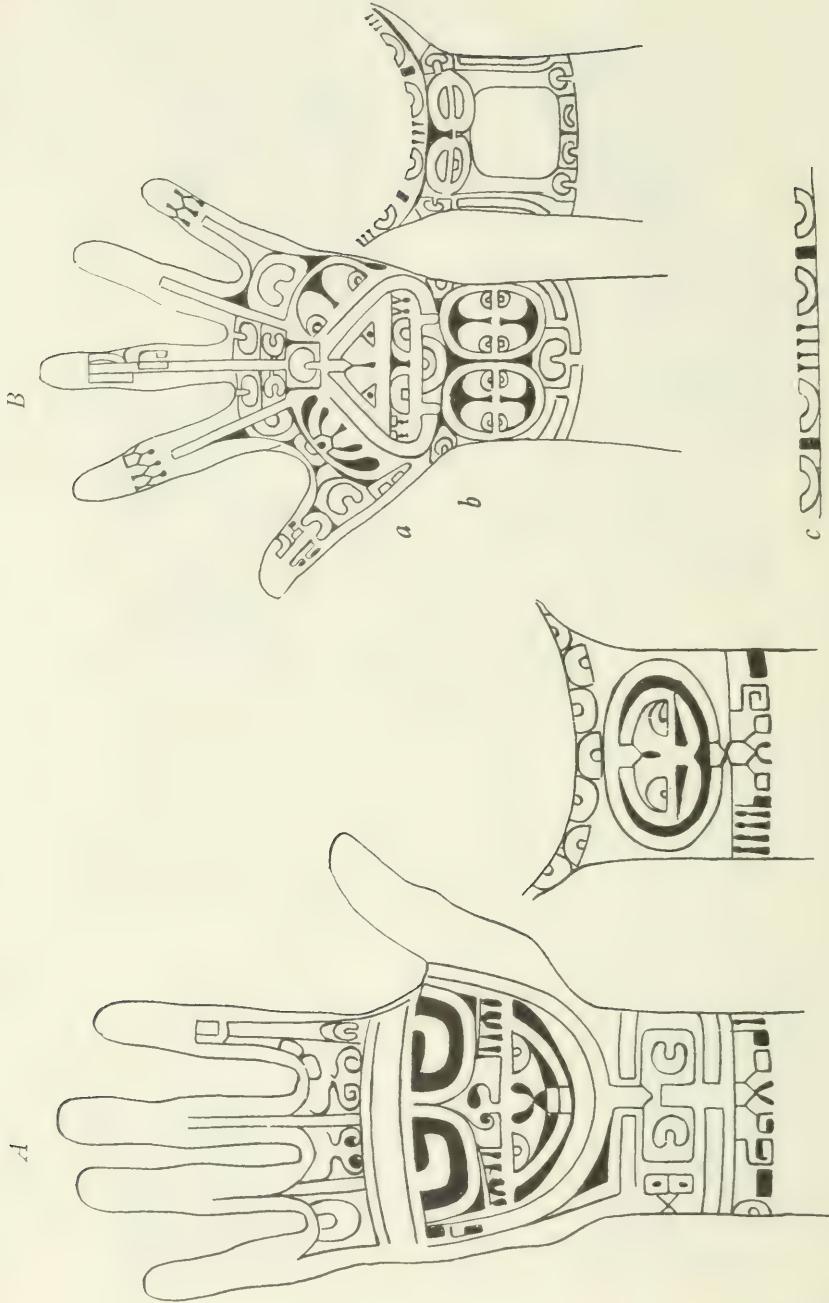


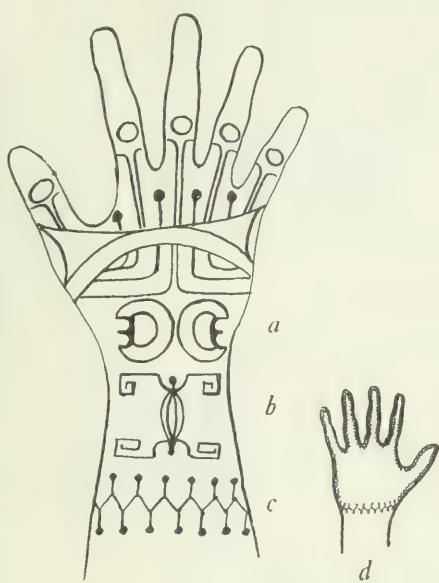
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A*B**C*

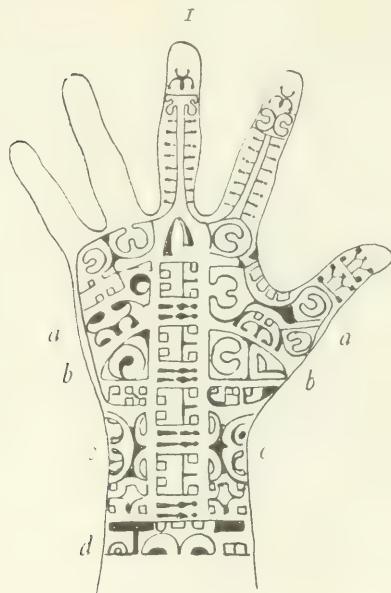
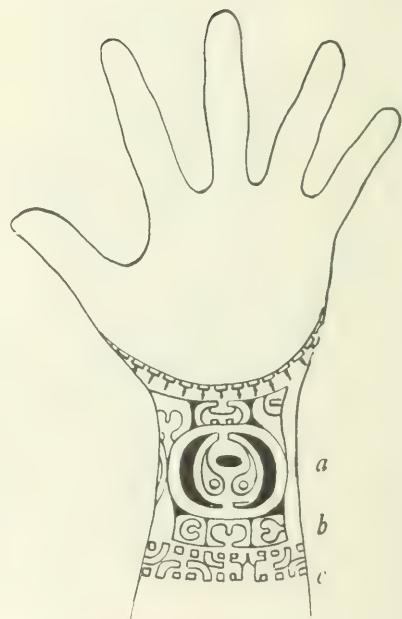
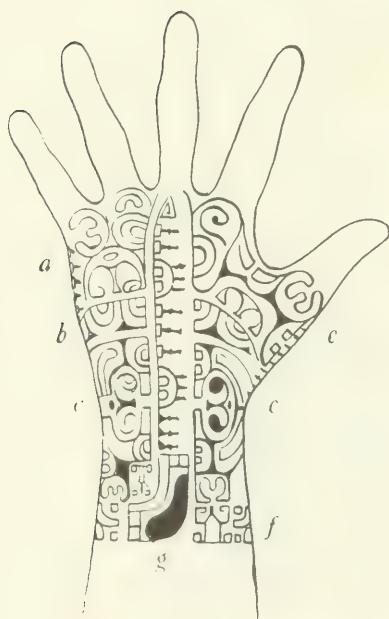
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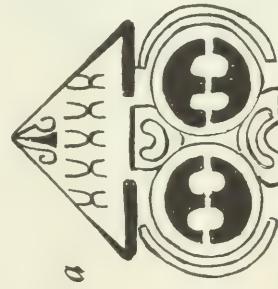
A*B**I**C*

TATTOO DESIGNS IN THE MARQUESAS

*A**I**B**2*

TATTOO DESIGNS IN THE MARQUESAS

A



a

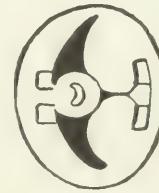


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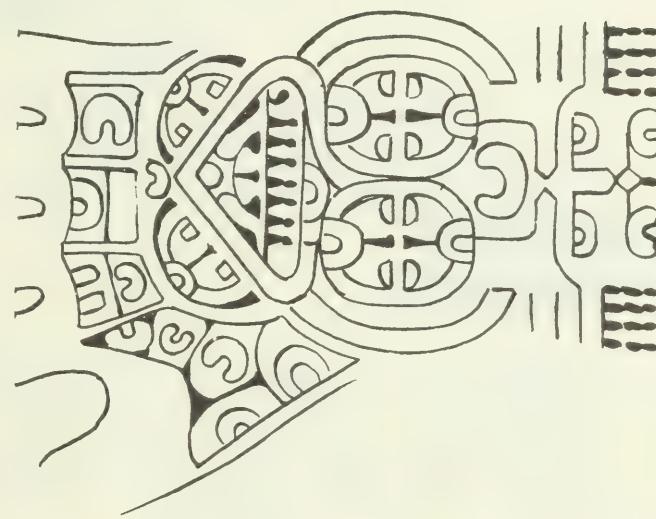


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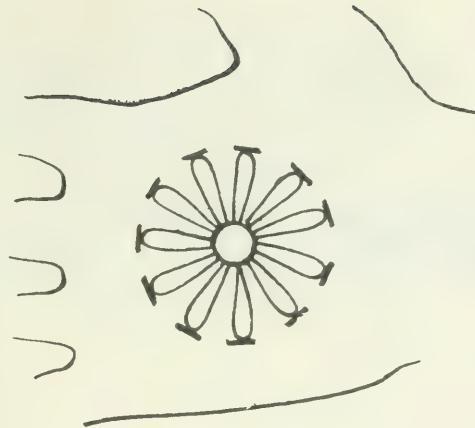
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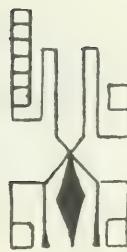
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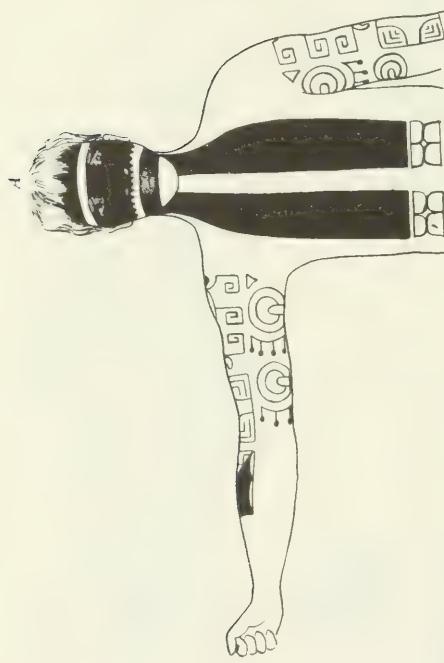


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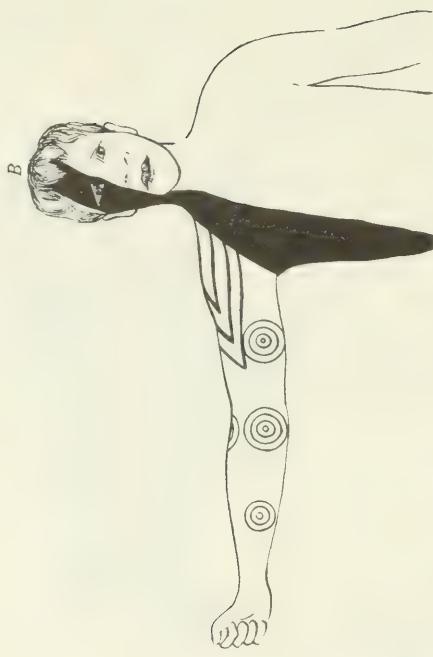


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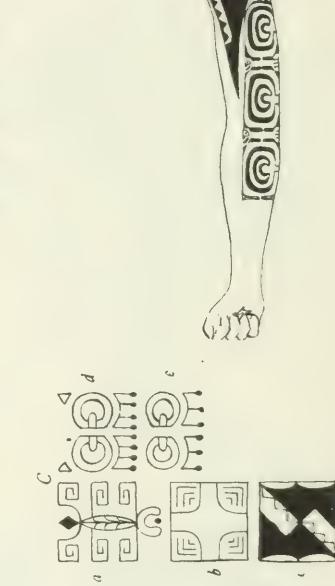




A



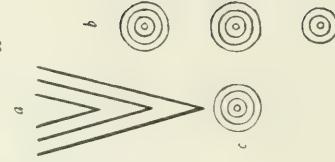
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C

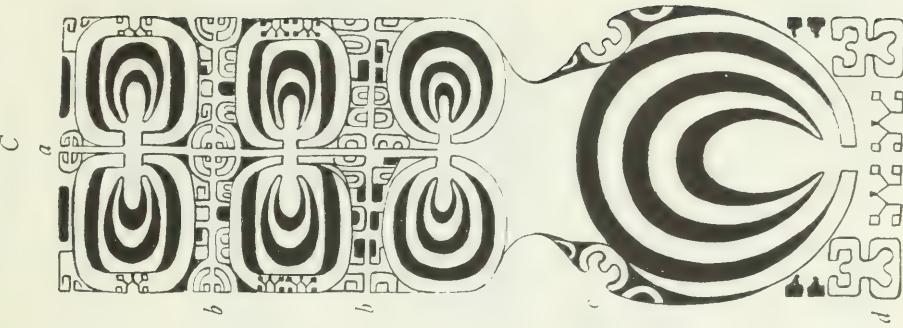


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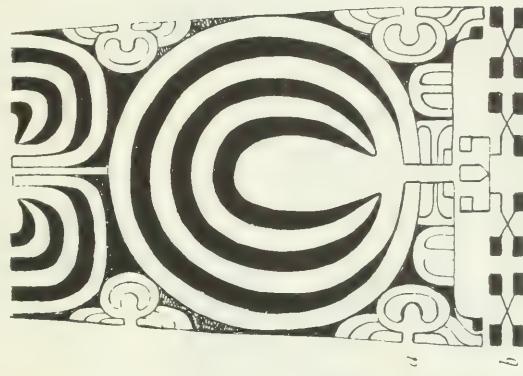


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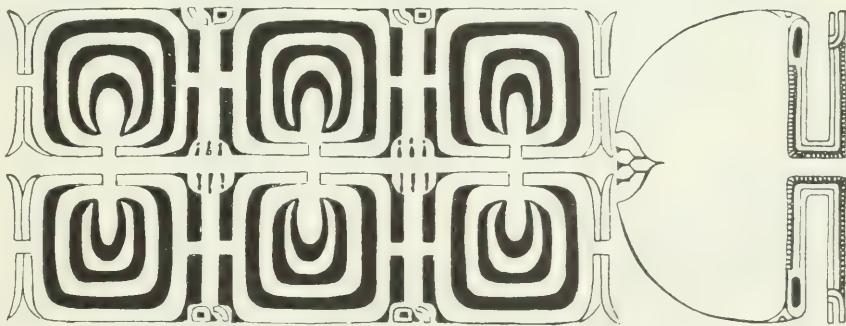
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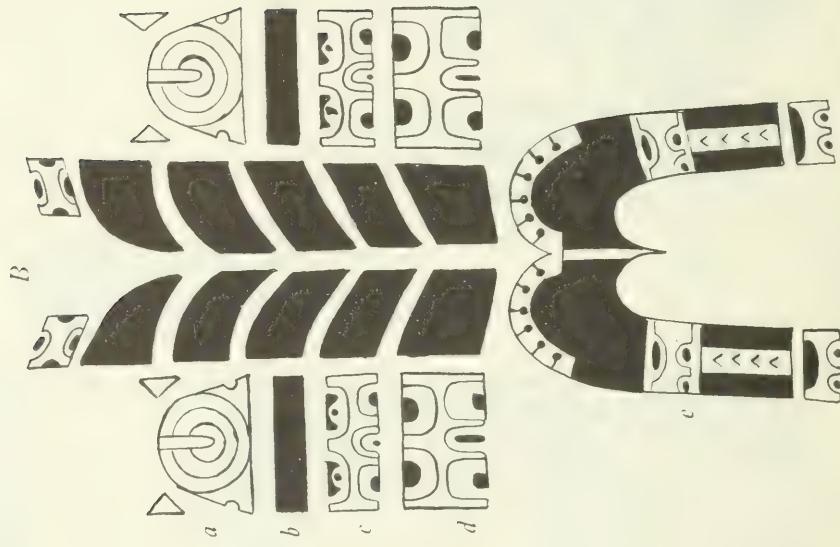
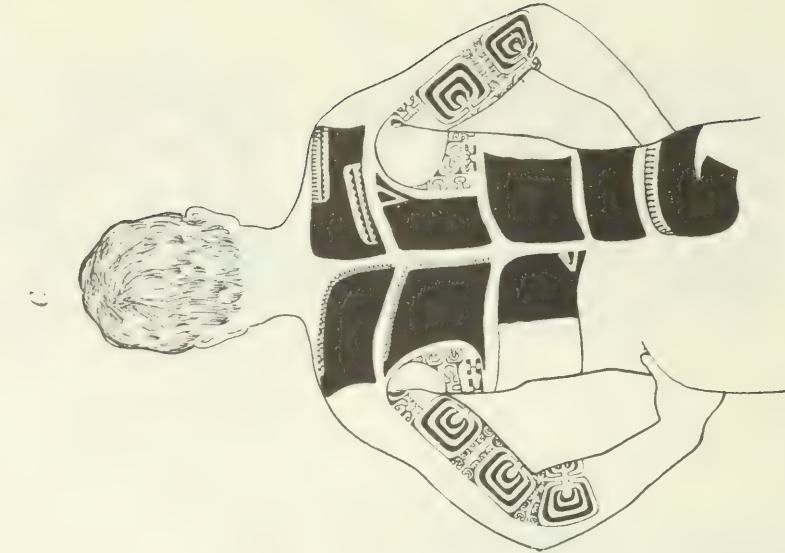


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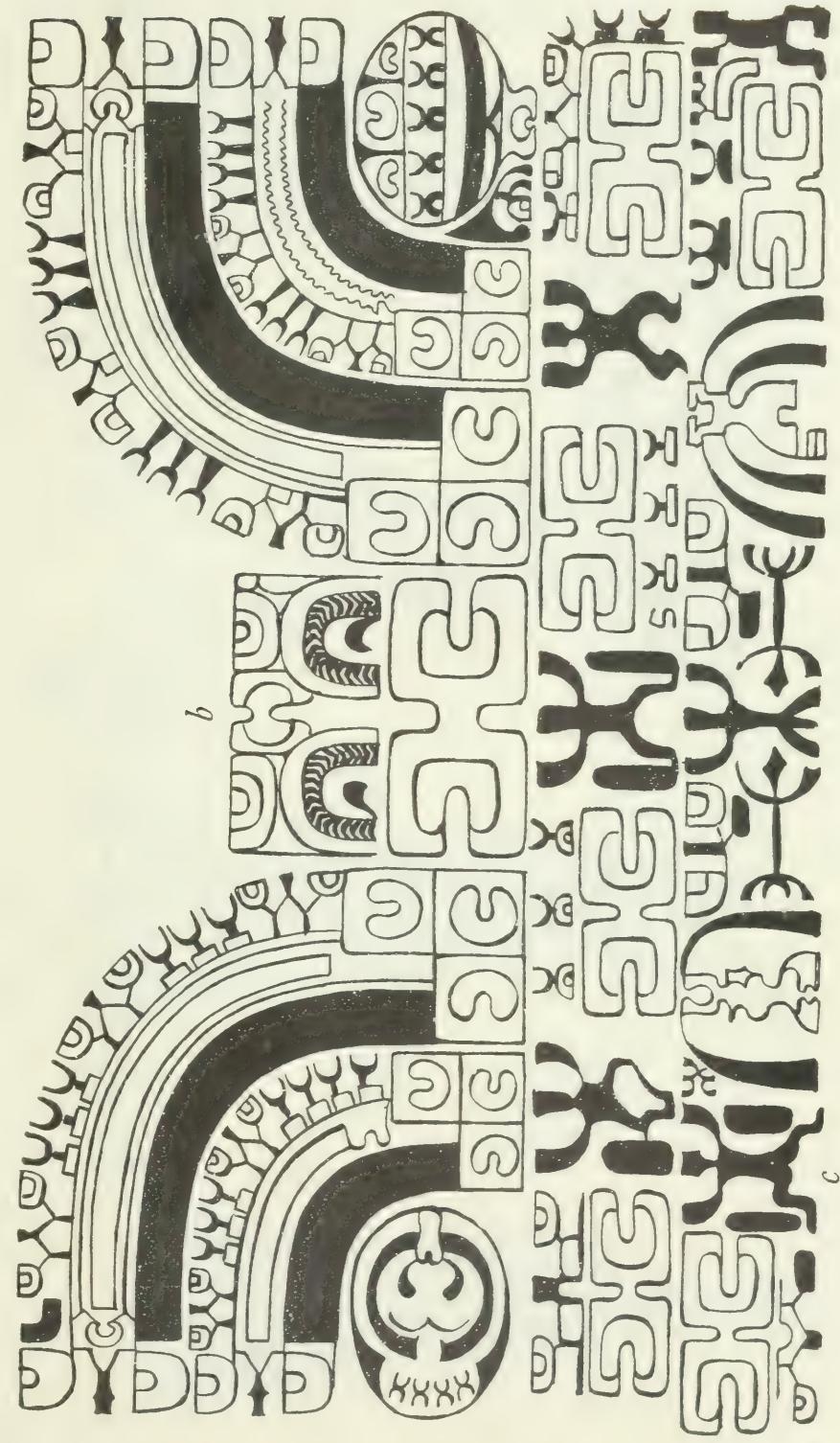


A





TATTOO DESIGNS IN THE MARQUESAS



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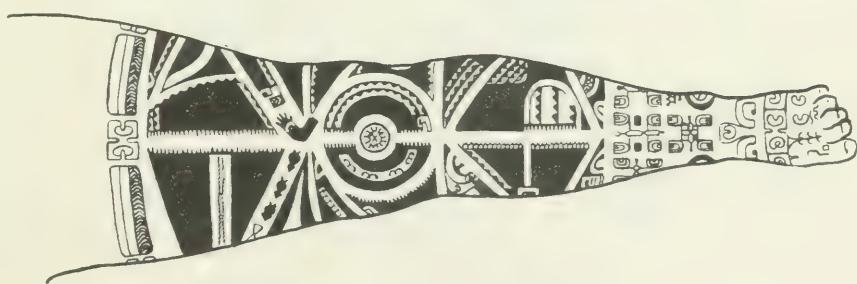
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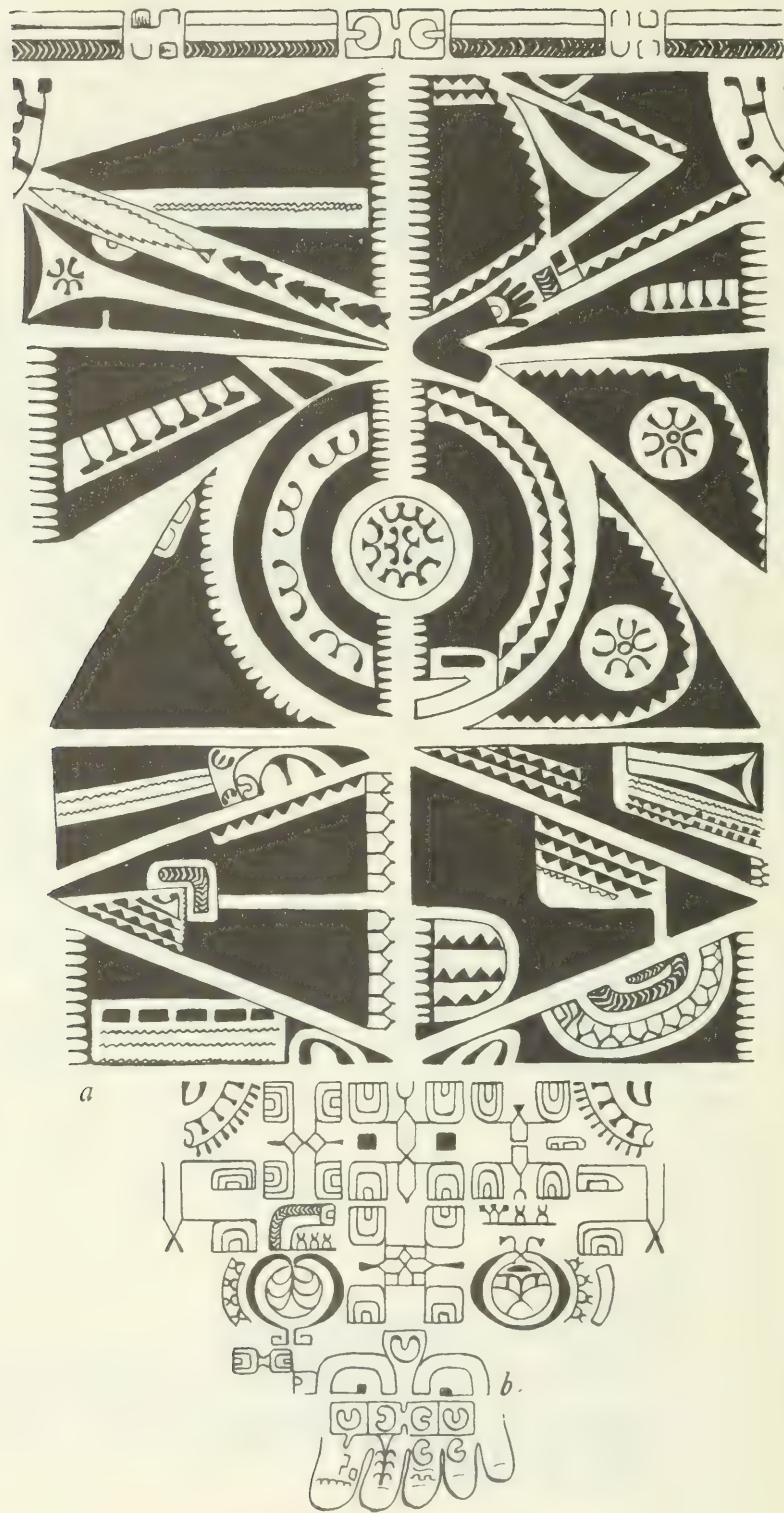


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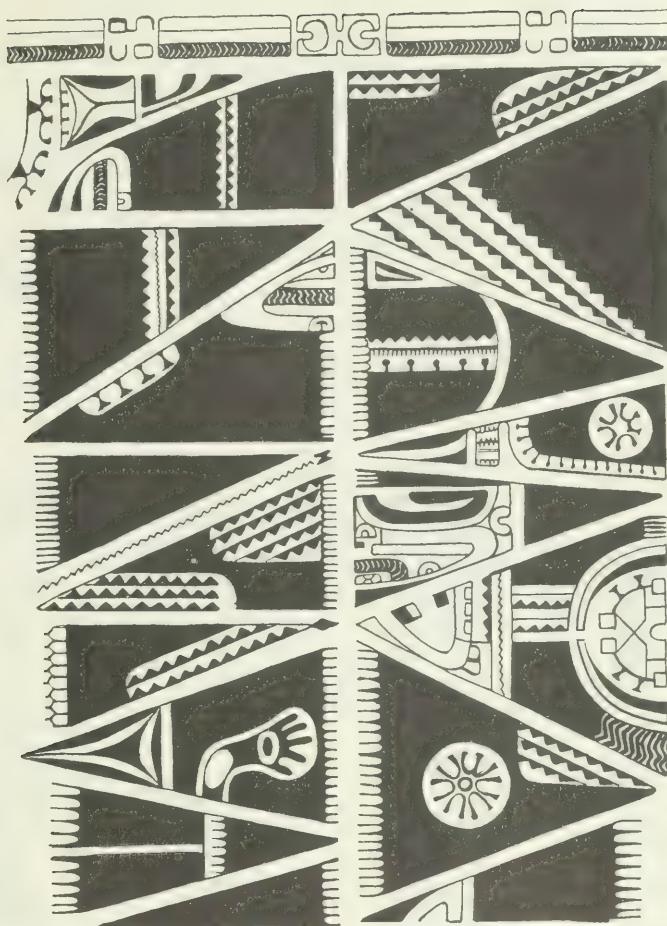
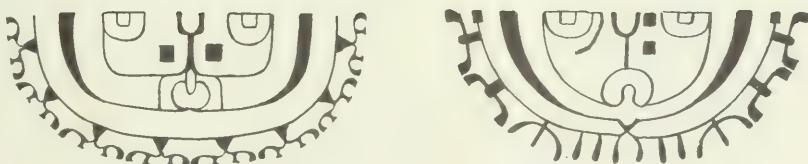


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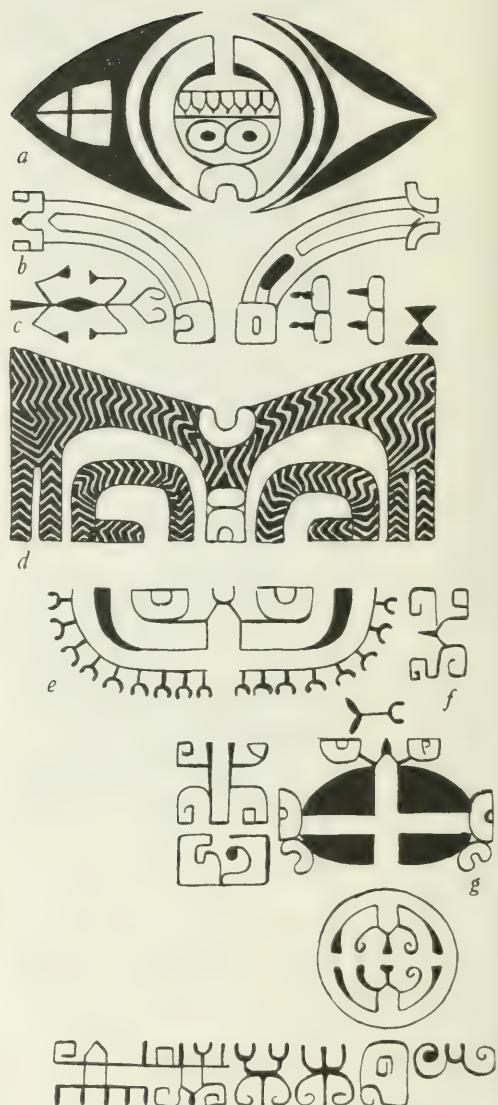




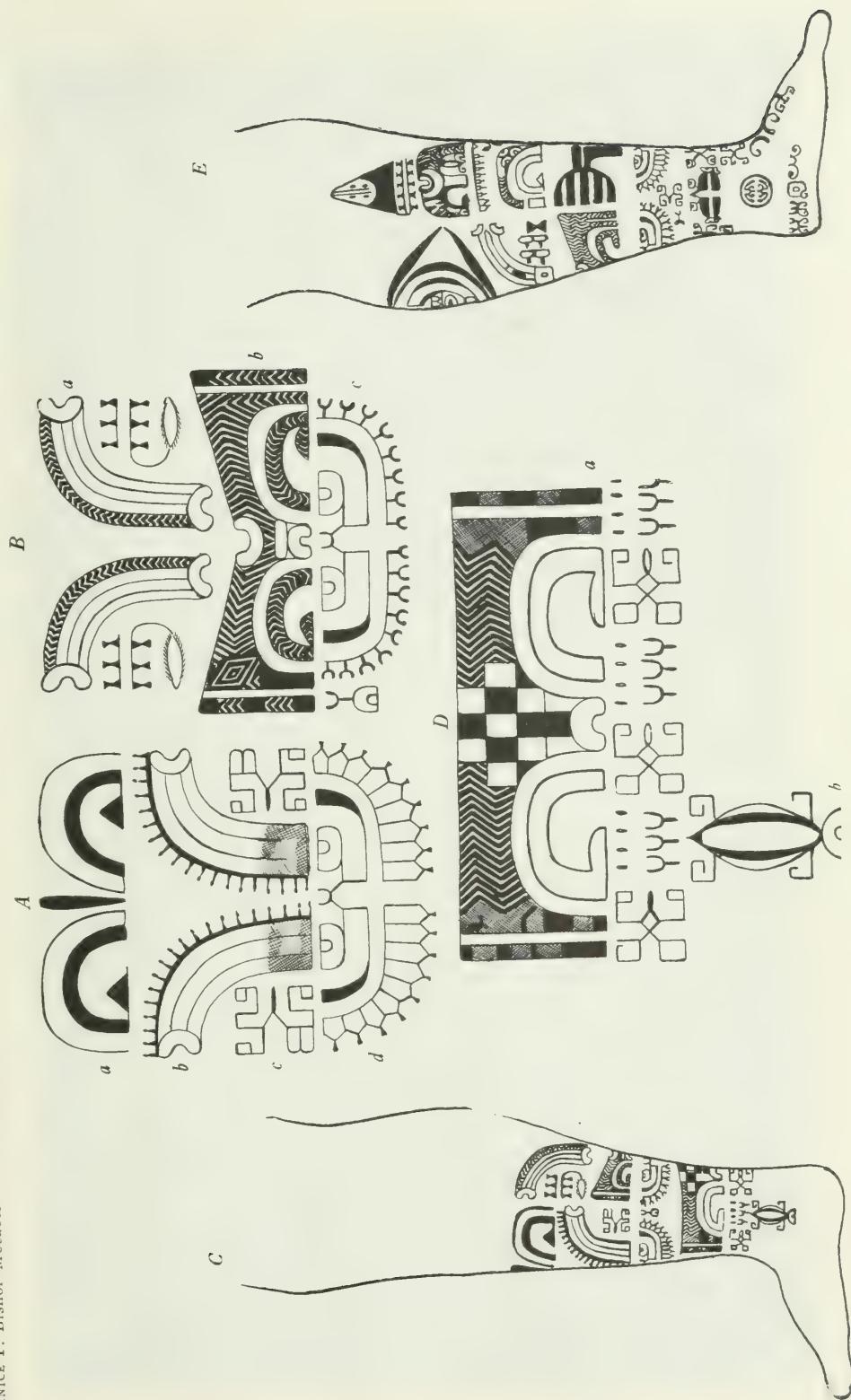
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A*B**C*

TATTOO DESIGNS IN THE MARQUESAS

A*B*

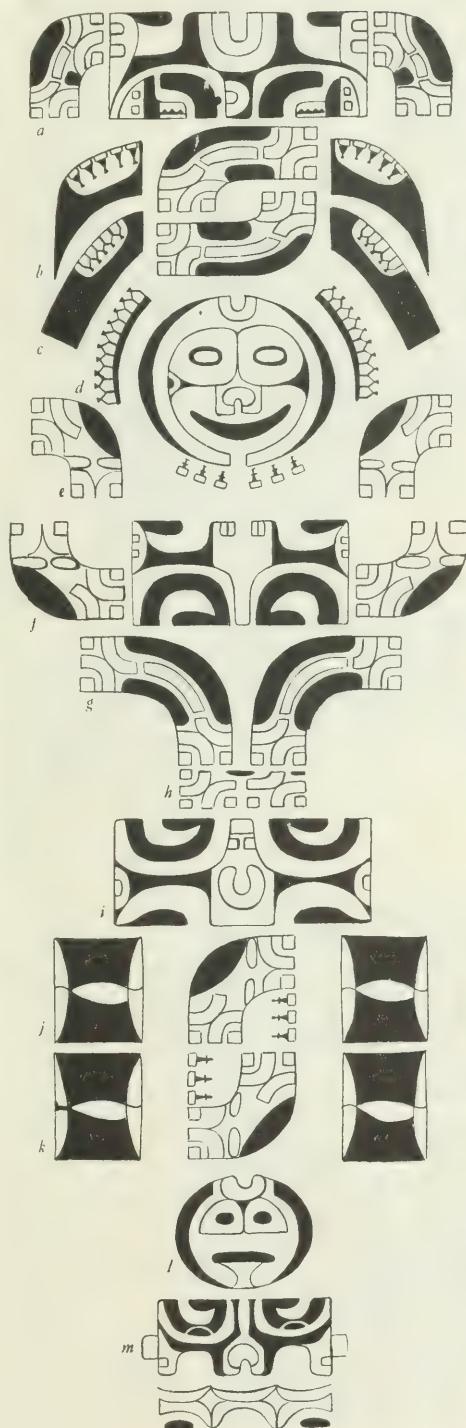
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TATTOO DESIGNS IN THE MARQUESAS

A*B*

A



B



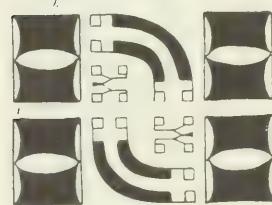
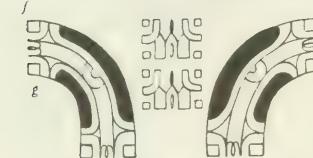
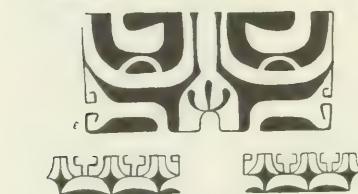
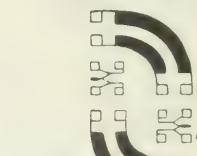
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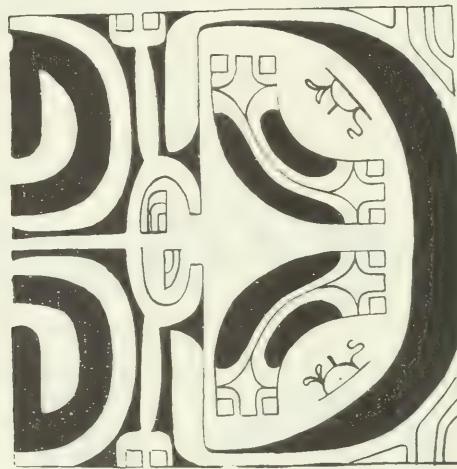
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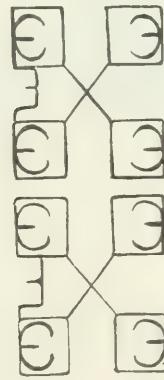
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C



D



E



F
PIUHEKU

C



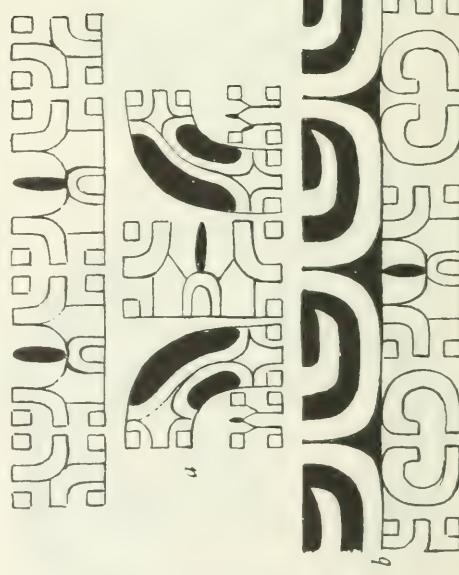
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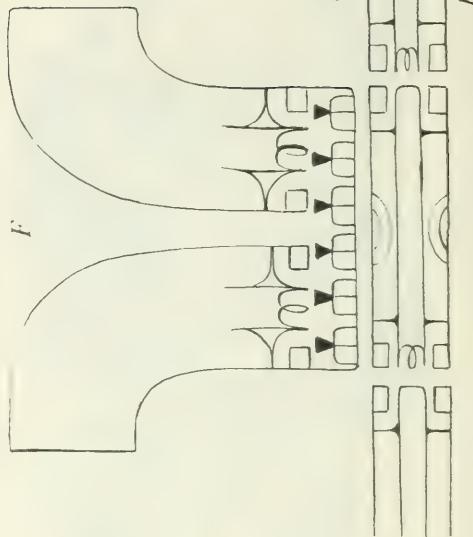
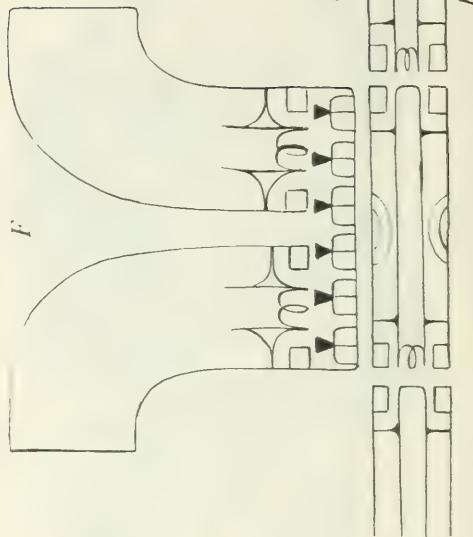
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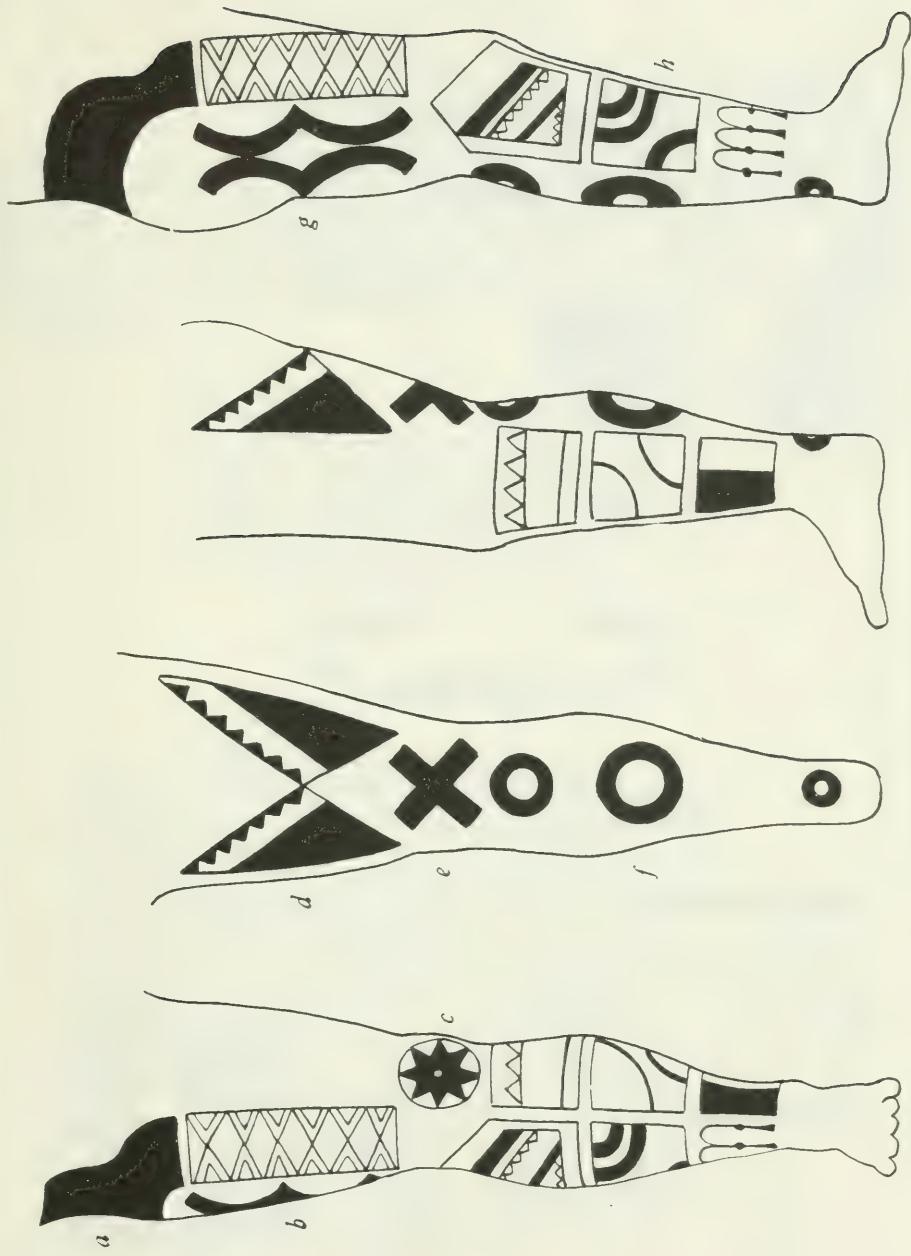


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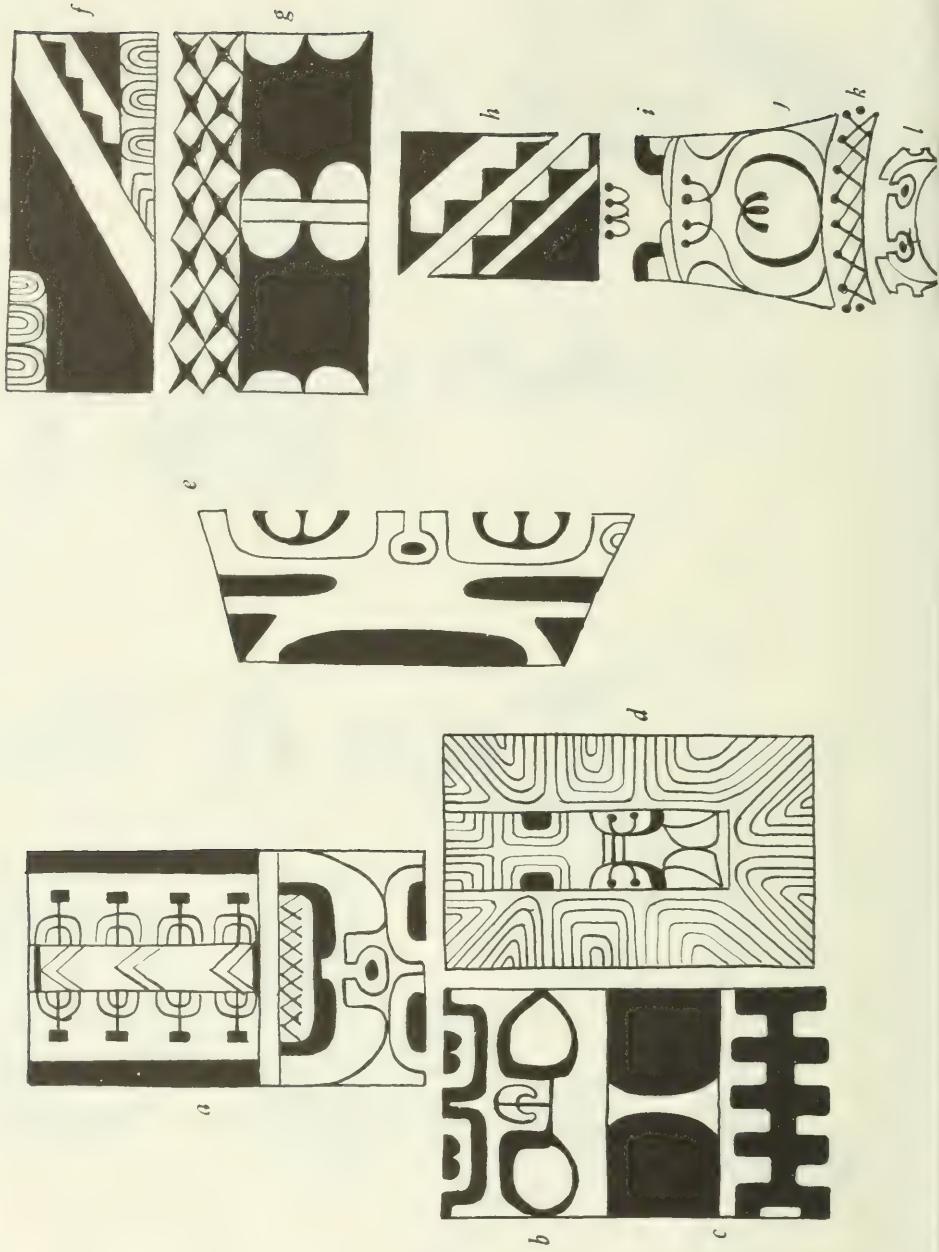


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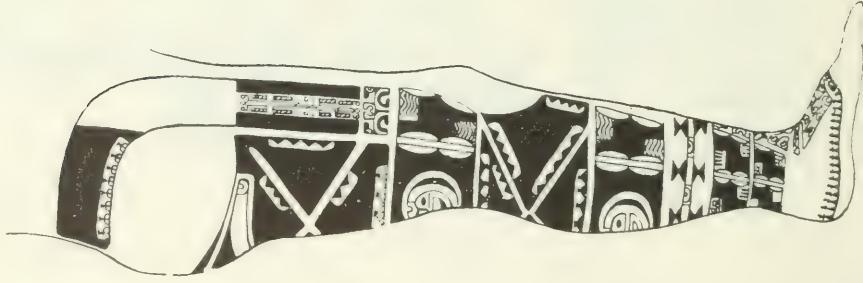
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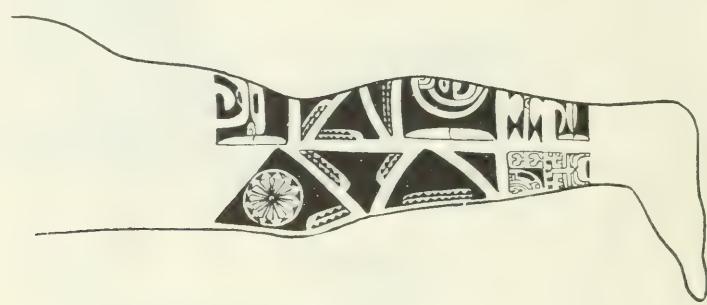
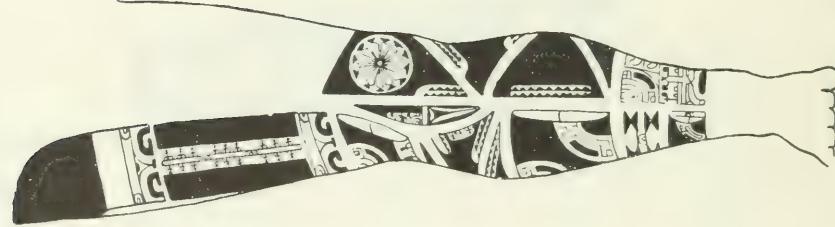


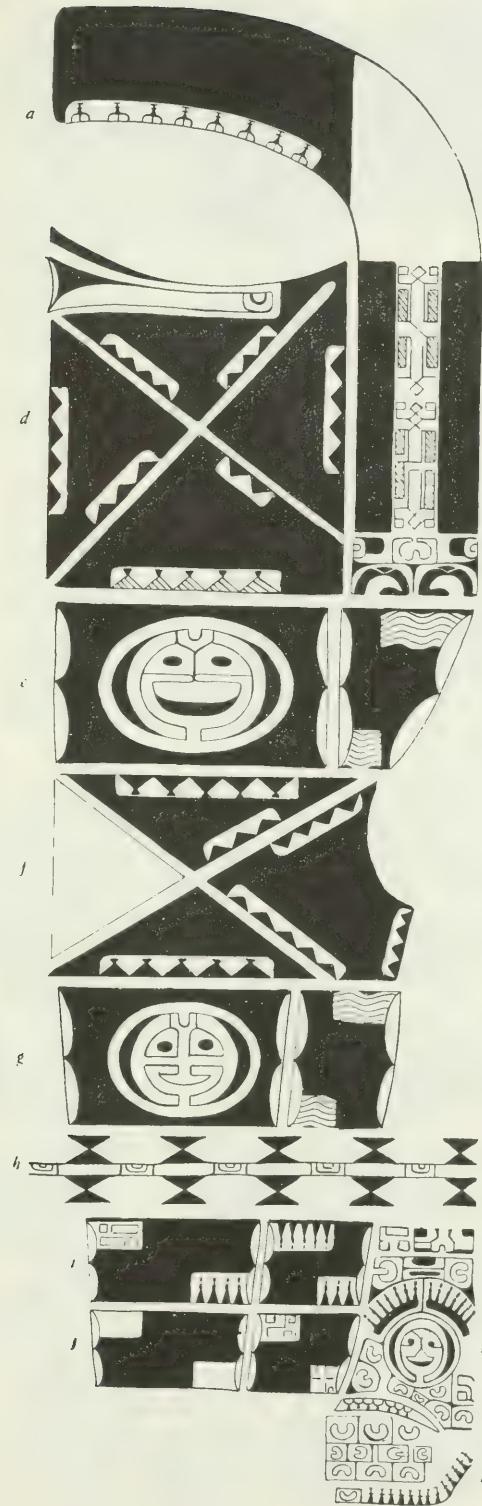
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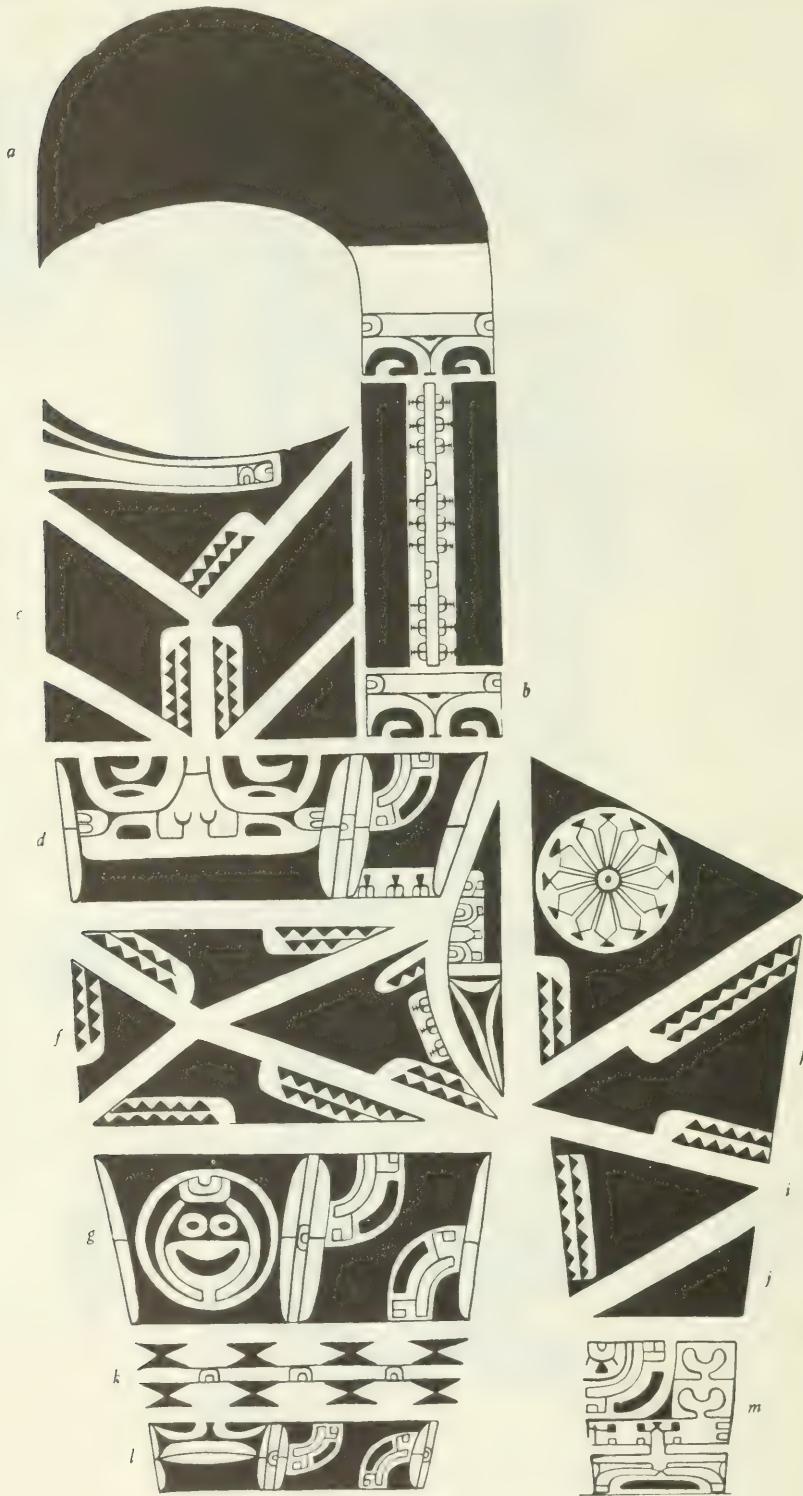


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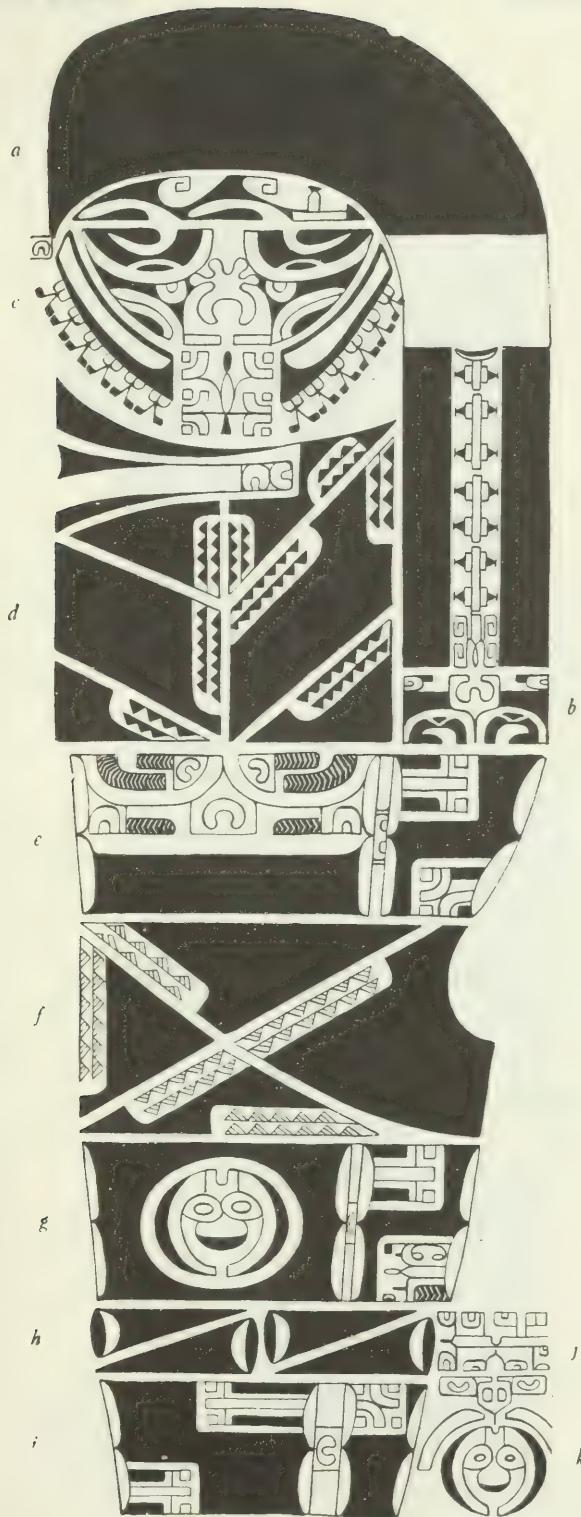




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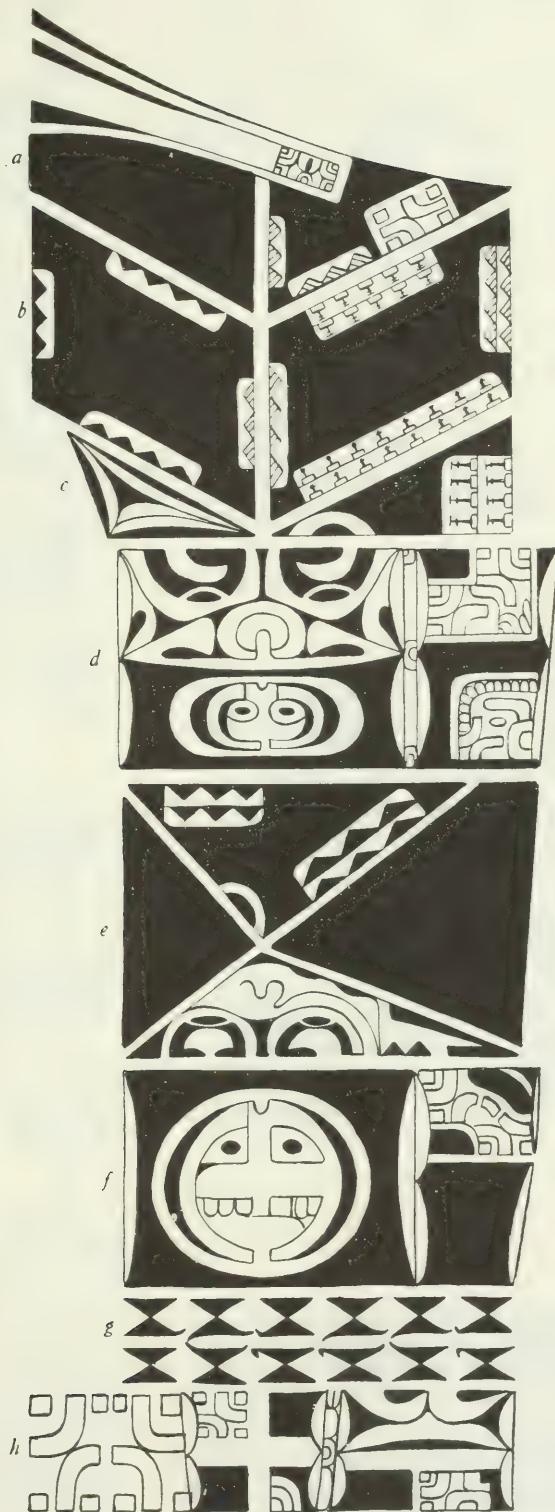
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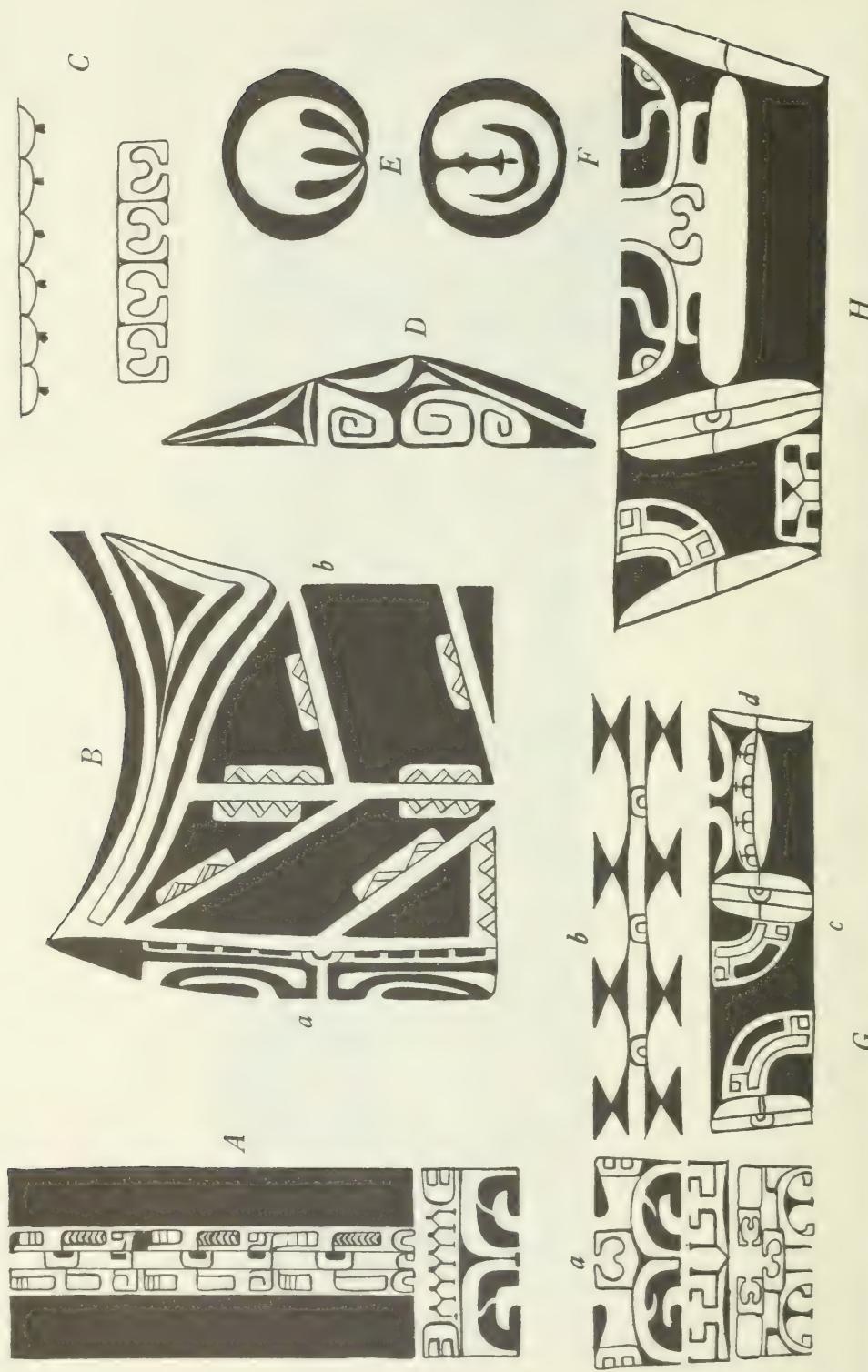
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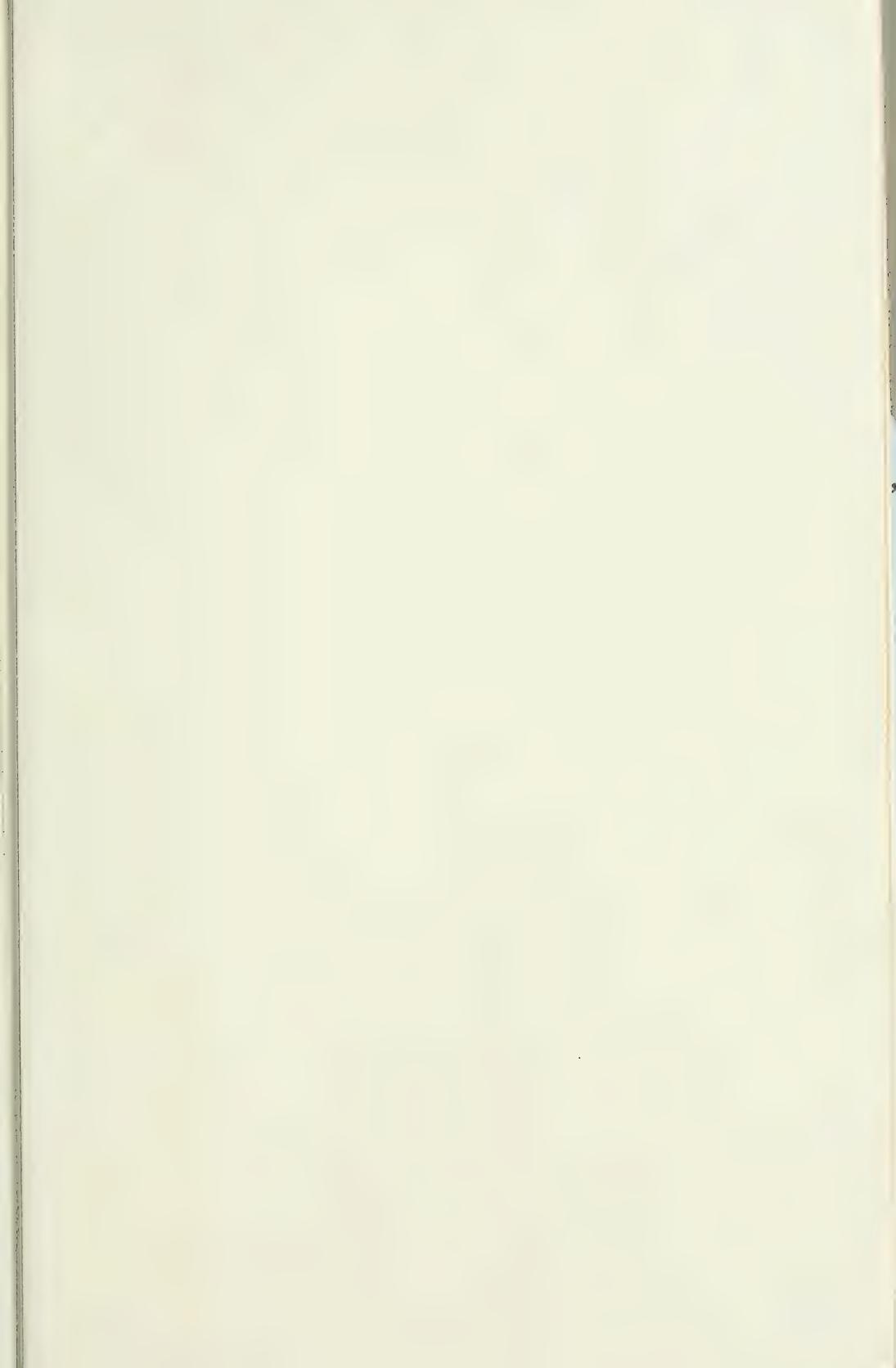
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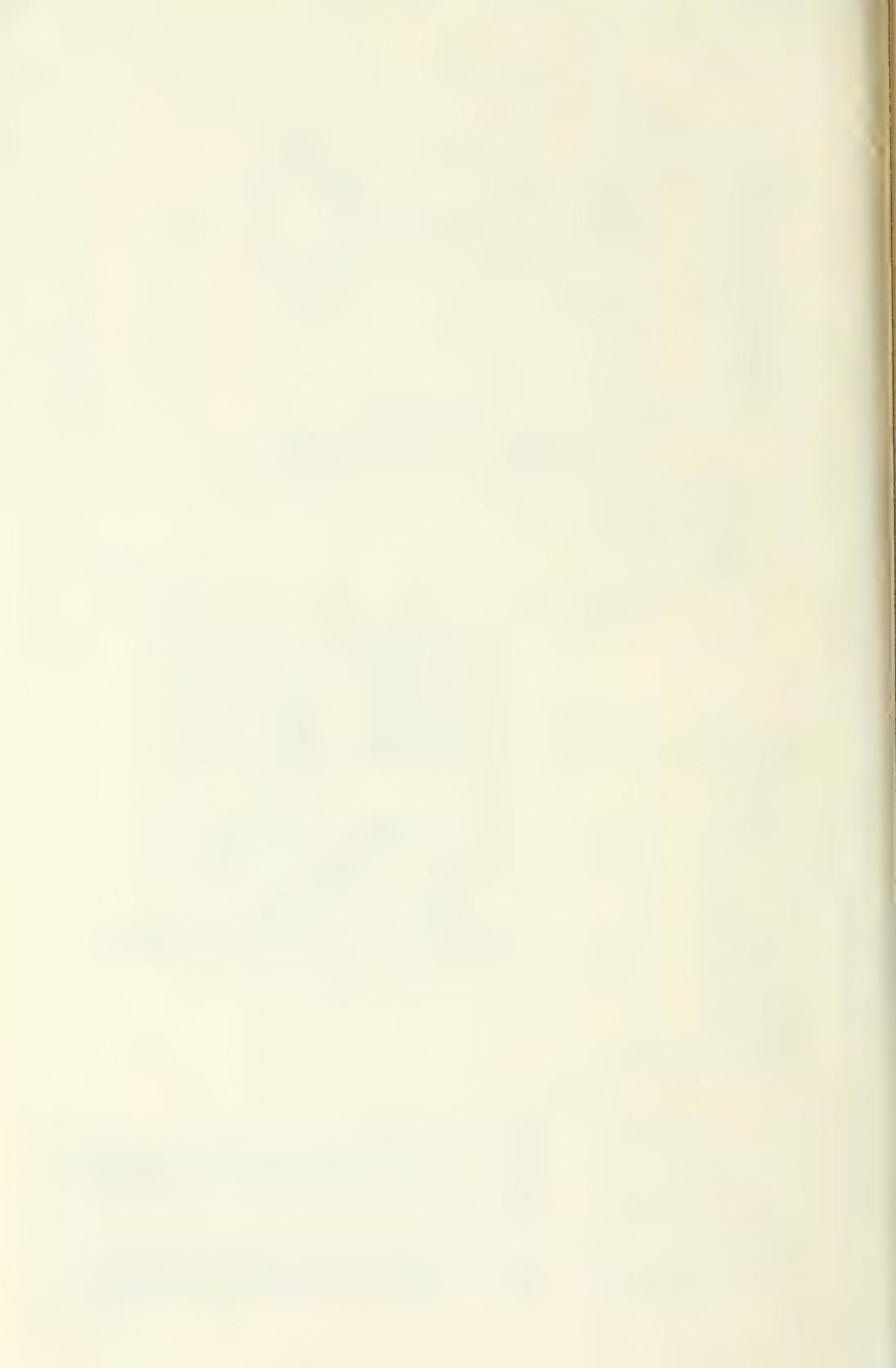


TATTOO DESIGNS IN THE MARQUESAS



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EARLY REFERENCES TO HAWAIIAN
ENTOMOLOGY

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J. F. ILLINGWORTH

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BULLETIN 2

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Early References To Hawaiian Entomology

By J. F. ILLINGWORTH

INTRODUCTION

While examining the narratives of the early voyages of the Pacific, I came across several entomological references so interesting that I decided to extend the search and present the results in a form more readily available to workers in this field.

As the investigation proceeded, references multiplied so rapidly that I decided to call a halt with the year 1900, as the numerous papers appearing since that time are fairly well known.

In preparing the bibliography an effort has been made to examine all available printed matter dealing directly or indirectly with Hawaii, but it is not unlikely that some references have been overlooked, especially in the earlier writings of the missionaries.

It is a pleasure to acknowledge the assistance received—particularly in regard to the more recent publications—from the published bibliography by D. L. Van Dine (224)¹ and from the card catalogues that have been gradually built up in Hawaiian institutions.

The subject of the distribution of organisms, especially in the Pacific, has a most important bearing upon our life here in the Hawaiian islands. Among insects, practically all of our pests have gradually arrived along the lines of commerce; and even now, with our strict quarantine system, new ones continue to gain an entrance every year.

Hence, such a review of the literature is especially interesting and valuable, because it aids in determining the time of introduction and also the distribution of the various organisms found in Hawaii.

DISCUSSION OF THE LITERATURE

In reviewing the written history of these islands, I naturally began with the account of the voyages of Captain Cook (2), who discovered the Hawaiian islands in 1778. Diligent search failed to locate any reference to insects, although dogs, hogs, rats, and birds are mentioned. However, in a separate narrative, William Ellis, the assistant surgeon of this voyage of 1778, indicates clearly that at least house flies were troublesome. In describing the natives, Ellis says (1, Vol. II, p. 156),

They have also a kind of fly-flap, made of a bunch of feathers fixed to the end of a thin piece of smooth and polished wood; they are generally made of the

¹The references in parentheses refer to works listed in the bibliography on pages 19 to 50.

tail feathers of the cock but the better sort of people have them of the tropick birds' feathers, or those belonging to a black and yellow bird called Mo-ho. The handle is very frequently made of the bones of the arm or leg of those whom they have killed in battle, curiously inlaid with tortoise-shell; these they deem very valuable and will not part with them under great price. This ornament is common to superiors of both sexes.

Later, Captain Nathaniel Portlock referred to these brushes (4, p. 88) when describing the supplies purchased from the natives:

Curiosities, too, found their way to market and I purchased two very curious fly-flaps, the upper part composed of very beautiful variegated feathers; the handles were human bone, inlaid with tortoise-shell in the neatest manner which gave them the appearance of fineered (veneered) work.

Captain George Dixon, who was associated with Portlock refers to these objects (3, p. 272) as follows:

Fans and fly-flaps are used by both sexes . . . The fly-flaps are very curious; the handles are decorated with alternate pieces of wood and bone which at a distance has the appearance of fineered work; the upper part or flap is the feathers of the man-of-war bird.

Vancouver, also, mentions fly-flaps (6, Vol. III, p. 42) for the dispersal of offending insects; but makes no further references to entomology.

Apparently, the first entomological work in Hawaii was done by Doctor Johann Friedrich Eschscholtz, who at the age of 22, in the capacity of physician and naturalist, accompanied the Russian explorer Otto von Kotzebue on his first voyage. This brilliant student, upon his return to his native country was appointed professor of anatomy and afterwards director of the zoological museum of the university at the University of Dorpat, his native city. Kotzebue himself, though only an intelligent sailor, makes several interesting allusions (7, Vol. I, p. 306) to the fauna of the group:

"The chief employment of the royal ladies consists in smoking tobacco, combing their hair, driving away the flies with a fan and eating." Speaking of the king's daughter (7, Vol. I, p. 307), he says: "Behind her stood a little negro boy, holding a silk umbrella over her head to protect her from the rays of the sun; two other boys with tufts of red feathers, drove away the flies from her." And in describing how the sailors were entertained at dinner ashore, Kotzebue (7, Vol. I, p. 311) relates: "Each of them had, like us, a kanaka standing behind him with a tuft of red feathers to drive away the flies." Finally he speaks more directly of the fauna (7, Vol. III, p. 237), "The only original wild quadrupeds of the Sandwich Islands are a small bat and the rat. To these is added our common mouse, besides the flea, some species of *Blatta* and other noxious parasites."

In the appendix of the third volume of the narrative of Kotzebue's voyage (7, p. 376) is the description by Eschscholtz of our native Hawaiian butterfly, *Vanessa tameamea* and descriptions of all the new butterflies collected in the various countries visited. The other orders of in-

sects, taken during the voyage, were described later in separate papers, of which the most important are his "Entomographien" (8).

A missionary, James Montgomery, states that the boat used by his party swarmed with cockroaches at the time of its arrival in Hawaii (1822) (15, Vol. I, p. 365). In describing a gathering at a mission service, he says (15, Vol. I, p. 417), ". . . members of the royal family had servants in attendance with fly-flaps and fans of peacock's feathers to cool their faces and drive away the troublesome insects." He says also (15, Vol. I, p. 434):

There are no mosquitoes here; neither are there any bugs. When the latter are brought on shore in bedding or packages from shipboard, they presently die; the climate of the Society Islands is equally fatal to them. Flies are very numerous and annoying, . . . The few spiders, moths and dragon flies which we have seen, much resemble those of the South Sea Islands.

In referring to the table manners of the natives, Montgomery (Vol. I, p. 472) writes:

When a common fly was found drowned in their messes, they seemed at once to grow sick and turn away their faces with no equivocal expression of utter loathing. Flies, indeed, may be said to be an abomination with these savages—probably from some superstitious prejudice, for vermin far more disgusting are greedily picked by them from their own bodies—nay, from the very dogs—and devoured.

Gilbert F. Mathison, an English traveler, also remarked upon the troublesome house flies. In speaking of the chiefs in their home life (9, p. 365), he says he found "some asleep, some fanning away the flies . . ." He further states that the queen at the mission service "was attended by several female servants, carrying fly-fans" (9, p. 378). When dining with the natives, he notes (9, p. 401), "One brushed away the flies . . ."

C. S. Stewart, a London missionary who spent several years in the islands, also made reference (11, p. 153) to these annoying insects, describing the natives as "eating *poe* surrounded by swarms of flies . . ." Further, in referring to the unsanitary conditions and skin diseases of the people, he remarked the prevalence of head-lice, saying:

Dozens may, at any time, be seen sporting among the decorated locks of ignoble heads; while, not infrequently, a privileged few wend their way through the garlands of princes of the blood, or triumphantly mount the coronets of majesty itself.

As to the servants of the chiefs and the common people, we think ourselves fortunate indeed, if, after a call of a few minutes, we do not find living testimonies of their visit, on our mats and floors, and even on our clothes and persons! The bare relation of the fact, without the experience of it, is sufficiently shocking. But the half is not told; and, I scarce dare let the truth, here, run to its climax. The lower classes not only suffer their heads and tapas to harbour these vermin; but they openly and unblushingly eat them! Yet so fastidious are they in point of cleanliness, than an emetic could scarce be more efficaciously administered than to cause them to eat from a dish in which a fly had been drowned! So much for the force of custom, and the power of habit!

In 1824, Kotzebue made a second voyage to the Hawaiian islands and was accompanied, as before, by the naturalist, Professor Eschscholtz. Again this navigator remarked on the house flies, which were evidently abundant. He states, "Two young girls lightly dressed, sat cross-legged by the side of the queen, flapping away the flies with bunches of feathers," and that the queen ate, "Whilst two boys flapped away the flies with large bunches of feathers" (13, Vol. II, p. 207).

In the appendix of this second volume, Eschscholtz (13, Vol. II, p. 357) alludes to the entomological material collected in the Hawaiian islands:

The number of insects is small, as is indeed the case with all land animals; it is therefore creditable to our industry, that we were able to muster twenty sorts of beetles. A small *Platynus* is the only Carabide; in the water, two *Colymbetes* and a *Hydrophilus* were found. The only *Elater* belongs to a species (*Agrypnus N.*) in which we reckon various specimens found only in the old world, such as *Elater tormentosus*, *fuscipes*, *senegalensis*, etc.; beetles which have two deep furrows in the lower part of the neck-shield, to receive the feelers, and which go in search of their food at night. They resemble many of the European springing beetles covered with scales and included by Megerle under the name *Lepidotus*; such are *fasciatus*, *murimus*, *varius*. Two *Aphodii* were found; one of the size of the *Psammodius porculus*, but very flat, lives under the bark of a decayed tree, the wood of which has become soft. Another has the almost prickly shoulders of the *Aphodius stercorator* and *asper*; of these we form the species *stenocnemis* and include therein four new varieties found in Brazil and Luzon. It may be here observed that *Psammodius sabuleti* and *cylindricus* N. must be classed with *Aegialia* which, on account of the horny nature of the jaws, and the projection of the upper lip, enter into the same class with the *Trox*; the remaining kinds of *Psammodius*, however, do not at all agree with the character given them by Gyllenhal, and ought in their turn to be classed with *Aphodius*. Among the remaining beetles, all of which dwell under the bark of trees, a *Parandra* was the largest.

A few remarks on the various beetles mentioned by Eschscholtz will not be out of place here. The carabid, *platynus*, is probably one of the numerous small native Hawaiian species of Anchomenus. The two *Colymbetes* are undoubtedly our *Coplatus parvulus* (Esch.) and *Rhantus pacificus* (Esch.); possibly both introduced very early. The hydrophylid was later described by Eschscholtz as *Hydrophilus semicylindricus*, though it is now placed in the genus *Hydrobius*. Blackburn considered it an immigrant. The elatrid, *Agrypnus N.*, is undoubtedly the *Agrypnus modestus*, MacL., which is now placed in the genus *Adelocera*. This species is said to be widely distributed in Polynesia and elsewhere. I have had more difficulty in trying to place the two *Aphodii* mentioned. It is hard to say what the flattened species is; but the one with the "almost prickly shoulders" is probably *Ataenius stercorator* Fab. This widely distributed species, Blackburn states, is not rare in the neighborhood of Honolulu, yet no specimens of it are in the Hawaiian collections.

Finally, the cerambycid, *Parandra*, is undoubtedly *Parandra puncticeps* Sharp, which Blackburn and Sharp (120) state is closely allied to a species occurring in the Philippine Islands.

Lord Byron, though on a mission of mercy to the Hawaiian Government, spent some time during 1825 in exploration. In his narrative there are a few interesting references to the fauna and flora of the Hawaiian group. Andrew Bloxam, an enthusiastic student just out of Oxford, was naturalist on the voyage and though a botanist by preference, he collected many zoological specimens during the eighteen months spent in Hawaii. This material was deposited in the British Museum. Probably based on information supplied by Bloxam, Lord Byron (10, p. 252) states:

We met with only one Papilio, which Kotzebue has described under the name *Vanessa tamehameha* (*tameamea*). We caught one sphinx moth; brown, with a purple stripe on each side of its body, which glitters in the sun. There are several minute moths, several varieties of *Libellula* (dragon-flies), one species of *Cicada*, a black earwig, a wood spider and innumerable fleas.

It would be interesting to know what the cicada mentioned is, also the sphinx; no moth answering that description is in the Hawaiian collections.

Captain F. W. Beechey (14), an English explorer, who visited Hawaii in 1826 and 1827, apparently made no reference to the insect fauna, though his remarks (14, Vol. II, pp. 100 and 112) on the first export of a cargo of sugar to California are of interest, considering the prominence which the sugar industry has now attained.

In the Reminiscences of Rev. Sereno Edward Bishop I found two interesting references. Describing the customs of the chief, Bishop says: (16, p. 30):

Objects much in evidence among the natives, when visiting or at meetings as well as in their homes were their fans, and their fly brushes or kahilis. The fans were made from the ends of young coconut leaves. The broad end being elastic, threw the air far more efficiently than the stiff fans now commonly braided. Get an old-fashioned native fan for comfortable use. Small fly-brushes were used by all the people. They were about four feet long, the upper half of the stick having the tail feathers of fowls tied on. The kahilis of the chiefs were larger and more elaborate. The long handles were often beautifully encased with tubes and rings of human bone and whale-tooth, also turtle shell, all finely polished. A high-chief always had two or more attendants armed with such fly-brushes.

In discussing (p. 37) the destruction of the trees of the islands, Bishop remarks;

About 1860, a minute insect called "red spider" came to infest the under-side of the leaves to such an extent as in the course of a year to destroy every kou tree, not only in Lahaina, but throughout the group. The timber of the dead trees was cut and used for furniture, much being sent to Germany. The chief's great calabash bowls of kou are now rare and choice. Young trees of the species exist here and there. The trees have always succumbed to the insect pest before attaining any considerable size.

"Moolele Hawaii," written about 1832 by David Malo, a native, has interesting references (17, p. 65). Malo says:

The following are the flying things (birds, *manu*) that are not eatable: The *o-pea pea* or bat, the *pinao* or dragon-fly, the *okai*, (a butterfly), the *lepe-lepe-ahina* (a moth or butterfly), the *pu-lele hua* (a butterfly), the *nalo*, or common house-fly,

the *nalopaka* or wasp. None of these creatures are fit to be eaten. The *uhini* or grasshopper, however, is used as food.

The following are wild creeping things; the mouse or rat, (*iole*), the *makaula* (a species of dark lizard), the *elelu*, or cockroach, the *poki-poki* (sow-bug), the *koe* (earthworm), the *lo* (a species of long black bug with sharp claws) the *aha* or ear-wig, the *puna-wele-wele* or spider, the *lalana* (a species of spider), the *nuhe* or caterpillar, the *poko* (a species of worm or caterpillar), the *nao-nao* or ant, the *mu* (a brown-black bug or beetle that bores into wood), the *kua-paa* (a worm that eats vegetables), the *uku-poo* or head-louse, the *uku-kapa* or body louse.

Whence comes these little creatures? From the soil no doubt, but who knows?

Speaking of the animals imported from foreign lands during the time of Kamehameha I and as late as the time of Kamehameha III, Malo (17, p. 66), after enumerating those valuable for food continues:

There are also some flying things that are not good for food: such as the mosquito (*makika*), the small roach (*elelu liili*), the large flat cockroach (*elelu-papa*), the flea (*ukulele*, jumping louse). The following are things that crawl: the rabbit, or *iole-lapaki*, which makes excellent food, the rat or *iole-nui*, the mouse or *iole-liili*, the centipede (*kanapi*) the *moo-niho-awa* (probably the scorpion for there are no serpents in Hawaii). These things are late importations; the number of such things will doubtless increase in the future.

This prophecy has been abundantly fulfilled, for even now with our efficient quarantine, new organisms frequently gain entrance.

F. D. Bennet, an English naturalist, who came to the Pacific primarily to investigate the anatomy and habits of the whales of the Southern Pacific and to collect natural history material, discusses the insect fauna of Hawaii (24, p. 252) as follows:

Insects are not more numerous here than at the Society Islands; they present, also, nearly the same genera, and are equally remarkable for the apparent addition of many exotic kinds to those few which were found on the soil by our navigators when this archipelago was first discovered. Together with some smaller butterflies, we find at Oahu a *Venessa*, closely resembling the *V. atlanta* of Europe; as well as a second species, differing in no appreciable respect from *V. cardui*; and as the habitat of the latter insect is the thistle in the northern parts of the globe, so here the analogous species resorts to the prickly foliage of the *Argemone Mexicana*. A hawk-moth, (*Sphinx pungens*) similar to that inhabiting the Society Islands, is very common on the pastures in the vicinity of the coast. Its larva is large, of a green colour with longitudinal and oblique lilac bands on the sides, and has the characteristic horn on the back. The habits of the perfect insect are similar to those of the humming bird, hawk-moth, *Sphinx macroglossum*. It flies by day, and appears to seek the warmth and brightness of the noontide sun; and flitting from flower to flower, on which it seldom alights, it drains the nectar from the blossoms with its proboscis as it floats in the air with a rapid, vibratory motion of the wings. On one occasion, when I was endeavouring to capture this coqueting insect, a native came to my assistance and undertook the task in his own way: gathering two of the elegant blue convolvulus flowers around which the moth had been fluttering, and holding one in each hand in an inviting position, he cautiously approached or followed the insect to tempt it within his reach. The active but stealthy movements of the young and scantily-clad islander, as he pursued his shy game over the plains; the seducing attitudes he assumed, and the insinuating manner in which he presented the flowers to the moth when opportunities offered, afforded a very ludicrous scene. Although the exertions of my entomological friend were at this time fruitless, I have often seen the plan he adopted successfully employed by other natives; the hawk-moth, approaching the proffered blossoms, protrudes its long proboscis, which is seized with the fingers and the creature secured.

The insects we noticed here, though not at any of the other Polynesian Islands we visited, were large tarantula spiders, (*Lycosa Sp.*) the millipede or wood-louse, (*Oniscus asellus*) and centipedes, eight or ten inches long, their colour brown-yellow, the sides and abdomen blue. The luminous centipede (*Scolopendra electrica*) is also found in the houses at Honoruru, emitting its characteristic phosphorescent light, and leaving behind it a trail of luminous matter.

In a footnote Bennet gives this additional information:

Ships are, doubtless, the active, though involuntary agents in disseminating insects over remote regions of the globe. After we had been at sea for several weeks, or even months, it was not uncommon to find on board the Tuscan many kinds of land-insects in a living state, from the hardy beetle to the delicate and more ephemeral butterfly, whose germs had probably been received on board together with supplies of fruit and vegetables.

The statement quoted from Bennet is one of the earliest definite references that I have been able to find bearing upon the introduction of the cosmopolitan butterfly, *Vanessa cardui* Linn., other than the unverified report of four specimens sent to the British Museum, two collected by Captain Byron in 1825 and two by Captain Beechey in 1827. (See Bibliography Nos. 27 and 65.)

Dr. Alonzo Chapin, a resident missionary, in writing on the diseases of the Hawaiian islands in 1838, remarks (22, p. 253) upon the absence of malaria as follows:

Before going out to the Sandwich Islands, I spent several years in our southern states, much of the time in the low country of South Carolina; and was, during the hot seasons of the year, accustomed to recoil at every standing body of water, on account of the poisonous exhalations which they there emit, endangering the lives of every individual exposed to their influence. On my arrival at the islands, I more than once made the inquiry, "why the numerous kalo (taro) ponds are not productive of sickness." Thousands of acres are entirely converted into ponds of standing water in which the natives cultivate their kalo, while their houses are built on the narrow spaces between. These are never dry, and are often so numerous as to exhaust entire rivers in keeping them filled. I could not at once reconcile my mind to the belief of their innocuous tendency, notwithstanding circumstances are such as to make the fact very obvious. Though the ponds are subject to the perpetual influence of a torrid sun, they cannot become putrid by reason of the continual supply of fresh water, and multitudes of fish live and thrive in them, such is their freshness and purity.

The streams originate from springs and rain on the summits of the mountains, pour down their sides with great impetuosity and after a few meanderings are turned aside from their courses to irrigate the lands and replenish the ponds, or are discharged directly into the sea; and I know of no body of water emitting sufficient miasma to create sickness along its borders. I have occasionally met with stagnant ponds, which emit a foul and offensive odour, and could in no way satisfy myself of the reason for the exemption of the inhabitants along their borders from fevers, but by supposing the effluvia to be diluted and rendered inert by the continual currents of winds.

Small marshes abound but are fed by springs, and the pure mountain streams, and are thus prevented becoming noxious. They speedily dry up during a few weeks absence of rain; and the rivers also disappear unless kept alive by frequent showers, and the small pools, which remain at such times and which abound after every rainy season, do not become sufficiently putrid to exhale a fever-generating miasm.

If any one variety of soil has a specific power to produce malaria it does not appear to exist at those islands. The upland soil is there formed of decomposed lava, the lowland plains along the sea are constituted of a mixture of alluvion washed from the mountains, and decomposed coral. Its immunity from noxious exhalations is the same, whether parched with drought, or merely moist, as when the evaporation is most abundant, after the rains.

The habitations of the natives are for the most part considerably scattered, but are in a few instances crowded together in such numbers as to exhibit the dense appearance of our large towns and villages. There is, however, throughout, an entire exemption from those pestiferous exhalations which, so extensively, poison the atmosphere of populous places in hot climates. All animal and vegetable substances thrown away by the people, or cast up by the sea, are quickly devoured by the multitudes of starving dogs and swine, so that no detriment is experienced from their putrefaction.

With so entire an exemption from the existence of miasmata, there is also an entire exemption from those affections induced by it. Malignant bilious fevers do not occur, and as I shall, hereafter, have occasion more particularly to state, derangements of the liver and biliary organs do not prevail, neither is the stomach and intestinal canal, and other organs of the abdominal viscera subject to the numerous and complicated affections so common in every miasmatic region.

It should be borne in mind, however, that Chapin wrote before the relation of mosquitoes to malaria was known, and that probably these insects had not become generally distributed in Hawaii at that date.

Jarves' notes (23, p. 70) on the beginning of the silk industry in Hawaii are also of interest:

In 1836 Messrs. Ladd & Co. leased a portion of their land to Messrs. Peck and Titcomb, for the purpose of cultivating the mulberry and raising silk. They have now upwards of forty thousand trees, which at nine months growth, are as thrifty and forward as those of several years, in New England. As yet they have been disappointed in obtaining the silk worm, but are daily expecting a supply of eggs from China.

The following (23, p. 75) gives some indications of the proportions of the new industry:

At Mouna Silika, the mulberry-plantation, 85,200 of the black mulberry (*Morus multicaulis*) have been planted, and the ground and slips prepared for many more. Many thousands of the white mulberry (*Morus alba*) have also been set out. The average age of 42,000 of the former is six months, and it is computed that they will afford thirty and a half tons of leaves, sufficient to feed 1,200,000 worms. The leaves of one tree of eight months growth, weighed three and a half pounds, and a leaf of three months growth measured seven inches in length. The trees that were plucked, leaved out again in six weeks so fully, that they could not be distinguished from those in the same row which were left unplucked. They are planted in hedge rows, ten feet apart, and two feet separate in the row. The silkworm of the white species, which produces the finest silk, has been received from China, but the proprietors do not intend to raise them in numbers until the plantation is thoroughly stocked with trees, and the necessary arrangements for buildings, machinery, reeling, etc., be made in the United States, which one of the proprietors, Mr. Peck, is upon the point of visiting, for that purpose. If the natives can be taught the art of reeling silk, this branch of industry will be of infinite benefit to them, as the raising of cocoons is attended with so little expense and trouble. Women and children are particularly adapted to it, as well as old and infirm persons. Thus it will afford occupation to many who are incapacitated from entering into any laborious trade. The amount of land in the plantation is between three and four hundred acres, undulating partly wooded, and well watered.

These citations by James J. Jarves, who came here from Boston in search of health in 1837, are only a prelude to his later writing on Hawaii. In his history (25, p. 10) discussing the fauna, Jarves writes:

Insects are few, though mostly of a destructive or troublesome character. A species of caterpillar at certain seasons destroys vegetation to a great extent, eating even the grass to its very roots. A slug deposits its eggs in the cotton blossoms, which, when ripe, are pierced through by the young insects, and the staple entirely destroyed. Large spiders are very numerous and mischievous weaving strong webs upon shrubs and young trees, in such quantities as to check their growth, and even impede the passage through an orchard. A species of woodlouse fastens upon the limbs, entirely covering them, and which speedily exhausts the juices; and their growth is for the time effectually checked. A black rust, firm, hard, and stiff, like strong paper, resembling soot in its appearance, attacks many varieties of trees and plants, covering the bark, and even the leaves, giving them the singular appearance of being clothed in mourning. This causes no permanent damage, and while it disfigures fruit, does not appear seriously to injure it. Rats damage the sugar-cane to a considerable extent, annually. Though the Hawaiian agriculturist escapes many of the evils incidental to other tropical climes, enough exist here to make his labours no sinecure. The noxious vermin, such as mosquitoes, fleas, cockroaches, scorpions, and centipedes, are a modern importation, and have extensively increased. The bite of the two latter causes no permanent injury, and is not more injurious than the sting of a common wasp. They are very abundant about the seaports. No serpents, frogs, or toads, have as yet reached the islands. A small lizard is common.

Later, in his *Scenes and Scenery in the Hawaiian Islands*, Jarves refers to the extensive silk industry and the many difficulties that beset it. (See 28, pp. 105-112 and 164-9.)

The United States Exploring Expedition being principally a marine investigation, hardly touched upon the land fauna of Hawaii, yet I found two valuable references in the *Races of Man* by the naturalist, Charles Pickering. Discussing animals and plants of aboriginal introduction (26, p. 314) he says:

There are, however, uninvited attendants on human migrations; such as, a small species of rat, whose presence throughout Tropical Polynesia, seems nearly universal. On some of the more remote coral islets, the presence of this animal, proved to be the only remaining evidence of the visits of man.

On the other hand, the house fly, which so abounds at certain coral islands, was uniformly absent from the uninhabited ones. Various other insects, have doubtless been transferred from island to island by human means.

This, too, was probably the case with the lizards (*Scincidae*); for the agency of drift-wood, seems insufficient to account for their universal presence.

In referring to animals and plants of European introduction, Pickering (26, p. 333) writes:

We were informed at the Hawaiian Islands, that the centipede, was "introduced five years previously from Mazatlan." It has greatly multiplied at Honolulu; and during our visit, it made its first appearance on Maui.

The house scorpion, likewise abounds at Honolulu; and its introduction was equally attributed to vessels from Mazatlan. The other Polynesian groups, remain free from the above two pests.

The natives of the Hawaiian Islands, attributed the introduction of the mosquito to the same quarter; and we obtained evidence of the possibility of such an occurrence, in the larva continuing on shipboard for many days after we left Honolulu. One or more native species of mosquito, were observed at the other Polynesian groups.

It will be noted that these observations coincide with those of all the earlier navigators, that flies were evidently a native introduction previous to the appearance of European ships. That the house fly, *Musca domestica* Linn., will travel long distances by small boats is now a matter of common observation. Moreover, on this point there is the conclusive evidence by S. C. Ball (225), who recently investigated the migration of insects over sea, along the coast of Florida.

Since the natives in their wanderings in the Pacific previous to the appearance of white men, evidently took along their hogs and dogs, together with coconuts and other plants, it is only natural to conclude that flies also traveled from place to place with them.

That flies very early made their appearance in the Hawaiian islands, is further indicated by the great development of the kahilis or fly flaps. Dr. Brigham amplifies this point in his comprehensive review of Hawaiian feather work (193, p. 14), in which he says:

It is probable that a bunch of feathers used as a fly-flap was the primal form of feather work. Flies (*nalo*) were here though not in such abundance as found by early explorers on other islands of the Pacific; but even for this useful purpose the bunch of feathers was no doubt preceded by a bunch of leaves, and the prototype of the kahili seems to have been a stem of that most useful plant the *ki* (*Cordyline terminalis* Kunth). On many of the islands of the Pacific, a branch of *ki* was the symbol of peace and on the Hawaiian islands it shared in early times with a coconut leaf the representation of high rank

Very early the hand plumes became symbols of rank and on all public occasions kahili bearers attended a chief, or while he ate or slept a *kaakui* brushed away with small ones all troublesome insects. In public they were tokens; in private fly-flaps.

Indeed, it is hardly necessary to draw upon the imagination to understand the gradual development of the immense, symbolic kahilis with shafts of twenty feet or more in length, used at funerals of royalty; especially when it is known that small fly-flaps of similar construction have always been waved over the body at funerals in Hawaii to keep away these obnoxious insects.

In describing the Hawaiian fauna in 1850, Henry T. Cheever (33, pp. 105-6) says:

Not a noxious beast, reptile, or insect existed on the islands when first made known to Europeans. Now they have mosquitoes, fleas, centipedes, and scorpions.

The snake, toad, bee, and all stinging insects of the latter sort are still unknown. One would think the flea certainly indigenous, where now it is found so much at home both with man and beast; but the natives have an amusing story of the first time they got ashore from a ship, through the trick of a sailor, which is better to be imagined than told.

Whether that be true or not, the name by which they call the flea is pretty convincing evidence that it has not been known as long as some other things. It is called *uku lele*, or the jumping louse, the *uku* being an old settler from time immemorial, and nothing else they knew so much like the imported flea. So they named the stranger the jumping *uku*: it is one of the first aborigines

a traveler becomes acquainted with in going about among Hawaiians and sleeping in native houses, and it is the last he is so glad to bid good-by to when he comes away, though it is ten chances to one if they do not insist upon keeping him company and making themselves familiar half the voyage home.

The Royal Hawaiian Agricultural Society organized in 1850 did splendid work for several years. In the Transactions of this society I found a number of references to entomology. William Duncan (36) suggested good cultivation and clean culture for the eradication of insects and urged that land adjoining sugar plantations be either kept fallow or burned to keep away caterpillars.

Dr. Wesley Newcomb also contributed to the Transactions (37) an interesting paper in which (p. 95) he states that *Vanessa cardui* was introduced presumably at the same time as *Argemone mexicana* (poppy or thistle) though he does not suggest the date. Among other insects, he mentions three species of Sphynx, one of them, *S. pugnans*, being common at Honolulu. Of the small moths he recognized seven species as enemies of agriculture and gives the larval characters of the principal cut-worms. The corn leaf-hopper, or corn-fly, he records as a serious pest at that time. He mentions also the red spider as destructive to the leaves of many plants and a microscopic white fly (from his description difficult to determine) destructive to the leaves of melons. Mention, too, is made of a small caterpillar that bores into the stalks of tobacco—undoubtedly the tobacco split worm, *Phthorimaea operculella* Z. a rather serious pest in more recent years. The description of a wormlike borer of the sweet potato suggests the larva of our common pest, the sweet potato weevil, *Cylas formicarius* Fab. Newcomb states that he was not able to detect any true aphids, but he recognizes that the numerous ants filling the soil play an important part in the destruction of the larvae of pestiferous moths and of other insects.

At meetings of the Society in 1851, the introduction of the common honey bee was considered, and the next year it was reported (38) that three hives were coming from New Zealand by the first vessel direct to Honolulu. I could find no statement indicating that these ever arrived, but the record (42) shows that two years later an attempt to import two hives of bees from Boston proved unsuccessful because of the ravages of the bee moth on the way. In 1855, a report was presented to the Society upon the economic relation of insects to crops with suggestions for the importation of natural enemies of these from abroad (45). The report states that though wasps are abundant, bees have not yet been successfully introduced.

At a meeting in 1856 a very valuable paper was presented by the well-known botanist, Dr. William Hillebrand (46). This paper written by Valdemar Knudsen, deals primarily with the control of cutworms which

were evidently very numerous at that time. Descriptions (46, p. 96) are given of five kinds as follows:

1st. Brown, with a white stripe on the back and white belly. It grows to the largest size, fully $2\frac{1}{2}$ inches long and one-quarter inch thick. It is very voracious, and a single worm will strip a large plant, leaving nothing but the ribs.

2nd. Gray, with a brown back of a bright, shining appearance; it does not grow as large as No. 1. It is the regular cutworm that seems to enjoy nothing but the juice of the stems, which it will often cut off when quite large and hard.

3d. It is destructive as the former, and also like it in color and size, only not bright or shining on its back.

4th. Is bluish-gray, with head and tail white—rather rare.

5th. Mud-colored; is the one that appears every year, and seems able to do with less wet soil. It is not quite as voracious, nor does it attain the size of the former ones, but still is very destructive.

It is interesting to note that the cutworms were excessively abundant on land that had been flooded for a few days. This observation agrees with my experiences in North Queensland. The only explanation that I am able to suggest is that flooding in some way interferes with the natural enemies of these pests.

A great impulse was given to the investigation of the Pacific fauna by the coming of the Swedish Frigate "Eugenie" with a staff of trained investigators. These scientists arrived in Hawaii in August, 1852 and though their stay in the islands was short, they evidently improved the opportunity, for among the insects collected were about twenty new species, belonging to several orders. Unfortunately no record was made of their catches except of the new species. These records were worked up several years later—the Coleoptera by C. H. Boheman, the Orthoptera and Hemiptera by Carl Stal, the Lepidoptera by D. J. Wallengren, the Hymenoptera by A. E. Holmgren, and the Diptera by C. G. Thomson (49).

The coming of the energetic student, Rev. Thomas Blackburn, in 1877 marked a new epoch in the history of systematic entomology in Hawaii. Though his special hobby was Coleoptera, Blackburn collected all orders of insects and published papers on most of them (67). The extent of his scientific work during the six years of his stay is marvelous especially considering that it was all done at odd moments whenever his strenuous duties to the Church would permit. Indeed, so abundant were his catches that he kept almost a dozen specialists (principally in the British Museum) busy describing his material, in addition to all the descriptions that he himself prepared for the press. A glance at the bibliography (pp.) will give a suggestion of the extent of these labors. The following specialists assisted him in publishing his material: Bormans (105) handled the Orthoptera; McLachlan (110, 111, 138) helped with the Neuroptera including the Odonata; White (71, 81, 88, 100) did part of the Hemiptera; Butler (74, 90, 96, 106, 108), Meyrick (112, 122, 131) and Tuely (79, 80) all worked on the Lepidoptera; Sharp (75, 76, 77, 78, 85, 93, 99, 119,

120, 124) and Waterhouse (87), part of the Coleoptera; while Smith (86) and Cameron (97, 109, 125, 127) helped with the Hymenoptera.

In 1882 J. E. Chamberlin published an interesting paper dealing with the devastating hordes of cutworms, or army worms, on Oahu (104). The outbreak of this pest is said to have extended from the sandy beach to the mountains. The land over which the worms had fed appeared bare, as if scorched; cattle starved to death. Blackburn identified the species as *Prodenia ingloria* Walker, a cutworm known in Australia; yet all evidence goes to show that this pest was an old resident in Hawaii. I was particularly interested in the following statement by Chamberlin: "Whenever a tract is burned, a great flight of moths appeared immediately; and an army of worms shortly followed, entirely destroying the tender grass." This was exactly my experience with a similar species in North Queensland. Whenever an accidental fire ran through the growing cane, a scourge of cutworms soon followed to wipe out the crop just as it was beginning to recover from the burn. The only explanation that I was able to offer was that those abnormal conditions in some way upset the natural controlling factors so that the development of the pest, for a time, was not hindered by them.

The investigations of the Challenger Expedition were primarily marine. Small attention apparently was given to land fauna and few references to insects appear in the published works. Kirby, in describing the Hymenoptera collected, mentioned only three from Hawaii. (This is the only reference that I have been able to find.) But among the pelagic insects belonging to the genus *Halobates*, monographed by White (114), are several species found in Hawaiian waters. These were described and figured in colored plates, making their determination easy.

As a young graduate just out of the University of Oxford, the indefatigable worker, R. C. L. Perkins, came to the islands in 1892 (?). The results of his work of more than twenty years stand as a monument to the hardships that he endured and the efforts that he put forth. During these years numerous papers were published, but the general results from the study of the tremendous amount of material he collected appear in the three large volumes of the *Fauna Hawaiensis*. Of this work the following parts were published previous to the year 1900: Macrolepidoptera by E. Meyrick; Hymenoptera Aculeata by R. C. L. Perkins; Formicidae by August Forel; Orthoptera, Neuroptera and Coleoptera Rhynchophora, Proterhinidae, Heteromera and Ciidae by R. C. L. Perkins; and the Coleoptera Phytophaga by David Sharp. Since the *Fauna Hawaiensis* is available in the principal libraries, I have not taken space to list the numerous species described.

IMPORTANT IMMIGRANT INSECTS

Among the introductions by European commerce was the night mosquito (*Culex quinquefasciatus* Say), a pest of first importance especially as a carrier of disease. Though it has been generally understood that these insects came to us from the coast of Mexico, it is interesting to read the following account by Osten Sacken (118):

About 1828-30 an old ship from Mazatlan, Mexico, was abandoned on the coast of one of the Sandwich Islands. Larvae of *Culex* were probably imported in the water-tanks upon it. The natives soon became aware of the appearance round the spot of a—to them unknown—blood sucking insect; it so far excited their curiosity that they used to congregate in the evening in order to enjoy the novelty. Since then the species spread in different localities, and in some cases became a nuisance.

This was related to me by Mr. T. R. Peale, the well known American entomologist and artist, who visited the Sandwich Islands a few years later with the United States Exploring Expedition under command of Captain C. Wilkes (1838-40). A distinguished American, who spent many years on the islands and whose acquaintance I made in Washington, confirmed the story to me, and told me that he remembered positively that there were no mosquitoes on the islands about 1823.

This version is at any rate more probable than another which I read in the German periodical, "Die Natur," that gnats were intentionally imported into those islands by a mischievous sea-captain, in vengeance against the inhabitants.

Another pest of importance in Hawaii is the sugar-cane borer, *Rhabdocnemis obscurus* Boisd., which was evidently introduced from some of the Pacific islands; Boisduval (20) in 1835 described the species from New Ireland and Fairmaire (32) later recorded it from Tahiti. This borer began to make inroads upon the sugar industry of Hawaii apparently during the early eighties (107, 113), rapidly spreading until brought under control by the introduced tachinid parasite (*Ceromasia sphenophori* Vill.). The species was recorded by Blackburn and Sharp (120) with a few brief systematic notes. The first careful study of the life history and economic relations was that by C. V. Riley (132), the specimens being sent to this celebrated entomologist at the request of his Majesty, King Kalakaua.

Another cosmopolitan insect found in Hawaii during recent years, though of little economic importance compared with the cane borer, is the milkweed butterfly, *Danaida archippus* Fab. This insect was not mentioned by any of the early voyagers and in fact the first reference to its presence in the islands is from Blackburn's material in 1878 (74). The geographical distribution of this species was reviewed in 1886 by Walker (126), who stated that these butterflies were abundant and well established in Hawaii at that date.

In the early nineties exotic scale insects began to command attention (134) and during the following decade fully fifty species had been re-

corded in Hawaii. *Icerya purchasi* Mask. is thought to have made its appearance in the islands during the spring of 1889. By 1890 it had become widely distributed in the gardens of Honolulu. During the following year, C. V. Riley (137) reported that it had been successfully controlled by the Vedalia beetle introduced from California. Nevertheless, other coccids began to make themselves felt, even attacking the coffee, which was so seriously affected that Mr. Albert Koebele, who had been so successful with the California State Board of Horticulture, was engaged in 1893 by the Hawaiian Government to search Australia for its natural enemies (143, 145). His work proved eminently successful and by 1895 there was a marked decrease in many of the scale insects owing to the natural enemies introduced (154). Chief among these friendly insects were lady bird beetles (Coccinellidae), fully three dozen species being in the list (153). As new scales continued to make their appearance in the islands, coming in on frequent plant and fruit importations, Koebele's valuable services were retained. By 1897 he had brought in fully 200 species of ladybird beetles besides many other natural enemies of various harmful insects (175).

The numerous scale insects were fairly well under control and Koebele began to turn his attention more seriously to other pests. In 1899 Koebele (202) wrote:

About the middle of April my attention was called to a troublesome fly upon cattle and on the 26th of the same month, the first specimens were brought to me . . . and during the summer it spread over all the islands.

This pest later proved to be the European horn-fly, *Haematobia irritans* Linn. which had reached the mainland of the United States about ten years earlier. Koebele further relates: "The first flies were noticed on the island of Oahu during February 1898, by Mr. J. P. Mendonca of the Kaneohe ranch." During 1900, pests of various crops were studied and the introduction of natural enemies was continued (215). It was at this time that a tineid larva of cotton balls was first reported, which eventually was found to be the pink boll-worm, *Geleckia gossypiella* Sndrs.

The Japanese Beetle (*Adoretus sinicus* Burm.) is reported to have come into the islands about 1891, probably in soil from Japan (142). Four years later it had already become such a pest that serious consideration was given to the introduction of such natural enemies as moles, bats, and toads (153). In 1897, 600 bats were introduced from California but apparently they never became established (175). Better results were secured by the introduction of toads from California and frogs from Japan. These reproduced freely in the streams here. But the spread of the beetle was rapid and by 1897 it was also reported from Maui and Kauai. Koebele

introduced a fungus that proved destructive to the beetle under wet surroundings (175), but unfortunately it appeared immune to this disease in the drier portions of the islands. During 1900 the Japanese beetles were reported (215) from the island of Hawaii, thus extending their range throughout the group, injuring the foliage of a large variety of cultivated trees and other plants.

It is reported that previous to 1898, all forms of melons, cucumbers and squashes could be grown in Hawaii with comparative ease. About this time a new pest that has come to be known as the melon fly (*Dacus cucurbitae* Coq.) began to make itself felt. Mr. Byron O. Clark who was the first to observe the flies said that they made their appearance during the summer of 1897 and that by 1898 and 1899 the melon industry was practically destroyed. The first published reference to the subject is in the form of correspondence printed in a weekly newspaper in Honolulu. The original is now almost unobtainable and so it is fortunate that the complete account has been reproduced in at least two scientific papers dealing with this serious pest. (See 184.)

DEVELOPMENT OF QUARANTINE SYSTEM

The entrance of so many noxious pests naturally stimulated a desire to shut out further introductions of these undesirable immigrants. During the reign of King Kalakua we find the beginning of this system in an Act dated July 16, 1890, relating to the suppression of plant diseases, blights, and insect pests (134). Again, in 1892, similar regulations were adopted in an Act to establish a Bureau of Agriculture and Forestry (139).

No one recognized the need of such regulations better than Professor A. Koebele who had devoted many years to a study of these organisms in various parts of the world. As official entomologist of the Hawaiian islands, in a letter (191) to Dr. Maxwell, who was special agent of the United States here at the time, he said,

Strict attention should be paid towards guarding against the introduction of melolontids, elaterid beetles, etc., destructive to living roots of plants, as well as to any fungoid diseases destructive to vegetation that are liable to reach the islands with soil or plants imported.

From these beginnings has grown up the efficient quarantine system that we find in the islands today.

BIBLIOGRAPHY

The following list is arranged chronologically and the names of authors are in alphabetical order under each year. For the convenience of workers resident in Hawaii the Honolulu libraries in which the publications cited may be found are indicated by the following abbreviations: AF, Board of Agriculture and Forestry; BM, Bishop Museum; DPI, Division of Plant Inspection, Board of Agriculture and Forestry; HS, Historical Society; HSPA, Hawaiian Sugar Planters' Experiment Station; PL, Library of Hawaii; UH, University of Hawaii; US, Hawaii Agricultural Experiment Station. References to publications indicated by an asterisk (*) have not been verified.

1. ELLIS, W(ILLIAM), An authentic narrative of a voyage performed by Captain Cook and Captain Clerke; . . . in search of a northwest passage between the continents of Asia and America. Including a faithful account of all their discoveries, and the unfortunate death of Captain Cook . . . 2 vols., London, 1782. (BM)
2. COOK, JAMES, A voyage to the Pacific Ocean, undertaken by the command of His Majesty, for making discoveries in the Northern Hemisphere. Performed under the direction of Captains Cook, Clerke, and Gore, in His Majesty's ships "Resolution" and "Discovery"; in the years 1776, 1777, 1778, 1779, and 1780. 3 vols.; vols. 1 and 2 written by Captain James Cook, F.R.S.; vol. 3 by Captain James King, LL.D. and F.R.S.; 2d ed., London, 1785. (BM)
3. DIXON, GEORGE, A voyage round the world but more particularly to the northwest coast of America, performed in 1785, 1786, 1787, and 1788, in the "King George" and "Queen Charlotte," Captains Portlock and Dixon . . . London, 1789. (BM)
The expedition visited Hawaii in 1786.
4. PORTLOCK, NATHAN, A voyage round the world but more particularly to the northwest coast of America, performed in 1785, 1786, 1787, and 1788, in the "King George" and "Queen Charlotte," Captains Portlock and Dixon . . . London, 1789. (BM)
The members of the expedition were in Hawaii from May 26 to June 13, 1786.
5. *FABRICIUS, J. C., Entomologica systematica . . . Hafniae (Copenhagen). 4 vols., 1792-4.
References to Hawaiian species in vol. 2, p. 269 (*Odynerus radula* Fab.), and in vol. 3, p. 463.
6. VANCOUVER, GEORGE, A voyage of discovery to the North Pacific Ocean, and round the world; . . . performed in the years 1790, 1791, 1792, 1793, 1794, and 1795, in the "Discovery," sloop of war, and armed tender "Chatham." . . . 3 vols. London, 1798. (BM)
Vancouver arrived in Hawaii March 2, 1792.
7. KOTZEBUE, OTTO VON, A voyage of discovery into the South Sea and Beering's Straits, for the purpose of exploring a northeast passage, undertaken in the years 1815-1818, . . . in the

ship "Rurick" translated edition by H. E. Lloyd.
3 vols., London, 1821. (BM)

Original, published in German at Weimar, 1821, contains colored plates
of butterflies described by Eschscholtz. English translation by H. E. Lloyd.
3 vols. London, 1821. (BM)

The expedition arrived in Hawaii November 22, 1816.

8. *ESCHSCHOLTZ, JOHANN FRIEDRICH, Entomographien, 1 Lieferung,
128, iii p., 11 col. pl., 23 1/2 cm., Berlin, G. Reimer, 1822.
The Hawaiian species described are: *Hydrophilus semiclindricus* (p. 42),
and *Blata punctata* (p. 86), which is a synonym of *Pycnoscelus surinamensis*
(Linn.).
9. MATHISON, G. F., Narrative of a visit to Brazil, Chile, Peru, and
the Sandwich Islands, during the years 1821 and 1822. . . .
London, 1825. (BM)
Mathison arrived in Hawaii June 24, 1822.
10. BYRON, LORD, Voyage of H.M.S. "Blonde" to the Sandwich Islands,
in the years 1824-5. London, 1826. (BM)
11. STEWART, C. S., Journal of a residence in the Sandwich Islands, dur-
ing the years 1823, 1824, and 1825, London, 1828.
(BM)
12. ESCHSCHOLTZ, FRIEDRICH, Zoologischer Atlas. Kotzebue's second
voyage, 1823-6, Berlin, 1829. (HS)
No Hawaiian insects appear to be discussed, but beetles and other ani-
mal forms from other Pacific islands are described and illustrated by colored
plates.
13. KOTZEBUE, OTTO VON, A new voyage round the world, in the years
1823, 1824, 1825, 1826. 2 vols., London, 1830. (BM)
14. BEECHEY, CAPTAIN F. W., Narrative of a voyage to the Pacific
. . . 1825-8. 2 vols. London, 1831. (BM)
The first export of sugar to California discussed (vol. 2, pp. 100 and
112); no Hawaiian insects mentioned.
15. MONTGOMERY, JAMES, Journal of voyages and travels by the Rev.
Daniel Tyerman and George Bennet, Esq. . . . London
Missionary Society, . . . in the South Sea islands, China,
India, etc., between the years 1821 and 1829. . . . 2 vols.
London, 1831. (BM)
Tyerman and Bennet reached Hawaii in April, 1822.
16. BISHOP, SERENO E., Reminiscences of old Hawaii. Originally pub-
lished in the Friend (BM) and in the Honolulu Advertiser
1901-1902. Reprinted in book form, Honolulu, 1916. (BM)
The Reminiscences relate chiefly to the period 1830-1860.
17. MALO, DAVID, Hawaiian antiquities. (Moolelo Hawaii), translated
from the original Hawaiian by Dr. N. B. Emerson: B. P. Bish-
op Mus. Special Publ. 2, Honolulu, 1903. (BM)
Most of Moolelo Hawaii was written 1835-36. Parts of it were printed
in 1838, 1839, and 1858.

18. BURMEISTER, HERMANN, Rhyngota seu Hemiptera. Beiträge zur Zoologie gesammelt auf einer Reise um die Erde, von Dr. F. J. F. Meyen, pp. 285-306. Nova Acta Acad. Caes. Leop., Breslau und Bonn, 1834. (BM)
Burmeister describes *Asopus griseus* Burm. (p. 293).
19. ERICKSON, H. W., Coleoptera and Lepidoptera. Beiträge zur Zoologie gesammelt auf einer Reise um die Erde, von Dr. F. J. F. Meyen, pp. 219-284. Nova Acta Acad. Caes. Leop. . . . Breslau und Bonn, 1834. (BM)
Erickson describes *Anchomenus corruscus* Erichs. (p. 223).
20. BOISDUVAL, J. A., Voyage de l'Astrolabe, pendant les années 1826-29, faune entomologique de l'océan Pacifique, Coleoptères, Paris, 1835, (BM) (AF)
Colymbetes pacificus Esch. and *Colymbetes parvulus* Esch. (p. 50) are described.
21. *DEJEAN, P. F. M. A., Catalogue des coleoptères de la collection de M. le Compte Dejean. . . . , 3d ed., p. 503, Paris, 1837.
References to Hawaiian species are *Colymbetes pacificus* Esch. p. 55, and *C. parvulus* Esch., p. 56.
22. CHAPIN, ALONZO (M.D.), Remarks on the Sandwich Islands; their situation, climate, diseases. . . . : Hawaiian Spectator, vol. 1, No. 3, pp. 248-267, Honolulu, 1838. (BM) (HS)
23. JARVES, J. J., Sketches of Kauai: Hawaiian Spectator, vol. 1, No. 1, pp. 66-86, Honolulu, 1838. (BM) (HS)
24. BENNET, F. D., Narrative of a whaling voyage round the globe from the years 1833 to 1836, London, 1840. (BM)
Bennet arrived in Hawaii April 16, 1834.
25. JARVES, JAMES J., History of the Hawaiian or Sandwich Islands. . . . , Boston, 1843. (BM)
26. PICKERING, CHARLES, The races of men and their geographical distribution: U. S. Exploring expedition . . . IX, Philadelphia, 1848. (BM) (HS)
This expedition made a brief call at Hawaii in September, 1840.
27. *DOUBLEDAY, EDWARD, First list of British Museum butterflies, London, 1844(?)
Describes four specimens of *Vanessa cardui* (p. 79) from Hawaii, two brought by Captain Byron in 1825 and two by Captain Beechey in 1827.
28. JARVES, JAMES J., Scenes and Scenery in the Sandwich Islands . . . Boston, 1844. (BM)
Describes the attempt to establish a silk industry at Koloa in 1837-1841, rendered unsuccessful by the ravages of aphid, or wood louse, which destroyed the mulberry trees and consequently starved the silk worms (pp. 105-111). The "silk plantation" at Hanalei is also discussed (pp. 164-169).

29. MOTSCHULSKY, VICTOR DE, Observations sur le Musée Entomologique de l'université impériale de Moscou: Soc. Imper. Nat. Moscou Bull., vol. 18, pp. 332-388, pls. 5-7, 1845. (AF)
 This paper discusses the beetles collected by Eschscholtz during his two voyages around the world, *Plagithmysus* n. g. for *Stenopterus pulverulentus* Esch. (pp. 369-70), Pl. 6, 5 figs. In error described from California.
30. MOTSCHULSKY, VICTOR DE, Remarques sur la collection de coleoptères russes da Victor Motschulsky: Soc. Imper. Nat. Moscou Bull. vol 28, pp. 1-85, pls. 1-3, 1845. (AF)
Stenopterus pulverulentus Esch. is erroneously recorded from California, p. 250.
31. *DOUBLEDAY, EDWARD, The genera of diurnal Lepidoptera, comprising their generic characters, a notice of their habits and transformations, and a catalog of the species of each genus. 2 vols., 86 pls. (85 col.), London, 1846.
 Reference to *Vanessa cardui* from Hawaii is found on page 205.
32. FAIRMAIRE, M. LEON, Essai des Coleoptères de la Polynésie: Rev. et Mag. de Zool., June, 1849. (HSPA) (AF) (US)
Hydrobius semicylindricus Esch. was collected in a taro plantation on Oahu (p. 30 of sep. = 434 of original). *Heterophaga mauritanica* Fabr. is recorded (p. 42); also *Calandra obscura* Boisd. from Tahiti (p. 70). This species of Calandra, originally described from New Ireland, is the well known cane-borer in Hawaii; now placed in the genus *Rhabdocnemis*.
33. CHEEVER, HENRY T., The island world of the Pacific, New York, 1851. (BM)
34. *FAIRMAIRE, M. L., Rev. et Mag. de Zool., p. 51, 1850.
35. DALLAS, W. S., List of specimens of Hemiptera in the British Museum, pt. 1, London, 1851; pt. 2, 1852. (AF)
 The species *Eysarcoris insularis*, pt. 1, p. 228 and *Rhyparochromus nigriceps*, pt. 2, p. 577, are described.
36. DUNCAN, WILLIAM, On the prevention and eradication of worms: Roy. Haw. Agric. Soc. Trans., vol. 1, No. 3, pp. 71-86, Honolulu, 1852. (BM)
 This paper, excellent for that period, deals only with the economic phases of the subject.
37. NEWCOMB, WESLEY (M. D.), Report of the committee on worms and other injurious vermin: Roy. Haw. Agric. Soc. Trans., vol. 1, No. 3, pp. 94-97, Honolulu, 1852. (BM)
 This is a valuable paper dealing rather specifically with the insect pests of agriculture.
38. THIERRY, BARON DE, Report on bees: Roy. Haw. Agric. Soc. Trans., vol. 1, No. 3, p. 116, Honolulu, 1852. (BM)
 Records the first attempt to introduce bees direct from New Zealand.

39. *WALKER, F. A., Catalog of the specimens of neuropterous insects in the collection of the British Museum, London, 1852.
Myrmelon perjurus n. sp., p. 340; *M. violentus* n. sp., p. 348, are described.
40. MOTSCHULSKY, VICTOR DE, Etudes entomologiques, 1852: Soc. Lit. Finnoise, 1853. (AF)
Under synonymies (p. 76), the author states: "*Plagithmysus pulverulentus* Esch. décrit et figuré dans le même ouvrage, appartient au genre *Oenemonia* Newman."
41. SMITH, FREDERICK, Catalogue of hymenopterous insects in the collection of the British Museum, London, 1853. (HSPA)
Prosopis anthracina n.sp. and *P. flavipes* n.sp., from the Hawaiian islands, are described (pt. I, p. 23).
42. CHAMBERLAIN, WARREN, Report of the committee on the honey bee: Roy. Haw. Agric. Soc. Trans., vol. 2, No. 1, pp. 53-57, also letter from C. R. Bishop, pp. 57-60, Honolulu, 1854. (BM)
This paper discusses the difficulties encountered in an attempt to introduce honey bees.
43. SIGNORET, DOCTEUR V., Revue iconographique des Tettigonides: Soc. Ent. France Ann., p. 15, pl. I (colored), fig. 15, 1854. (HSPA)
Describes *Tettigonia varicolor* n.sp., Honolulu, coll. Boheman et Signoret.
44. *STAL, CARL, Nya Hemiptera: Ofv. af K. Vet.-Ak. Forh., vol. 9, 1854.
Includes a reference to *Delphax pulchra* Stal.
45. MARSH, J. W., Report on birds, bees, insects, and worms: Roy. Agric. Soc. Trans., vol. 2, No. 2, pp. 47-50, Honolulu, 1855. (BM)
This is a purely economic paper dealing with pests and suggesting the introduction of natural enemies, various sorts being enumerated.
46. KNUDSEN, VALDEMAR, Report on worms: Roy. Haw. Agric. Sec. Trans., vol. 2, No. 3, pp. 94-97, Honolulu, 1856. (BM)
Contains interesting suggestions for the control of cutworms by protecting natural enemies and importing others, such as the black ant of North America.
47. SMITH, FREDERICK, Catalogue of hymenopterous insects in the collections of the British Museum, London, 1856. (HSPA)
Crabro unicolor (pt. 4, p. 421), *C. distinctus* (p. 422), and *Mimesa antennata* (p. 431), described from the "Sandwich Islands."
48. BOHEMAN, C. H., Coleoptera: Voyage de "l'Eugenie," Insecta, pp. 1-112, pl. I, Stockholm, 1858. (BM)
The following species are described from Honolulu: *Calleida insularis*, p. 4, also found in Tahiti; *Calleida amoena*, p. 4; *Lebia insularis*, p. 6, also found in Tahiti; *Selenophorus insularis*, p. 10; *Selenophorus picinus*, p. 11; *Trechus fasciatus*, p. 17; *Canthon balteatus*, p. 41; *Onthophagus muticus*, p. 48; *Ammophorus insularis*, p. 89.

49. VIRGIN, C. A., Voyage autour du monde sur la frégate Suédoise "l'Eugénie," . . . 1851-53, sous le commandement de C. A. Virgin. . . Zoologie I. Insecta, 617 pp., 9 Pls. Stockholm, 1858-68.
 The following groups of insects are discussed: Coleoptera, by C. H. Boheman, pp. 1-218, 1858; Hemiptera, by C. Stal, pp. 219-298, 1859; Orthoptera, by C. Stal, pp. 299-350, 1860; Lepidoptera, by H. D. J. Wallengren, pp. 351-390, 1861; Hymenoptera, by A. E. Holmgren, pp. 391-442, 1868; Diptera, by C. G. Thomson, pp. 443-614, 1868.
50. BOHEMAN, C. H., Coleoptera: Voyage de "l'Eugénie," Insecta, pp. 113-218, Pl. 2, Stockholm, 1859. (BM)
 The following genera and species described from Honolulu: *Oudemas* n. gen. (p. 138) created for *Oudemas aenescens*, p. 138; *Rhyncolus longulus*, p. 149; *Rhyncolus gracilis*, p. 150; *Megascelis subtilis*, p. 152; *Luperus insularis*, p. 182; *Graptodera verticalis*, also found in California and Tahiti, p. 187; *Crepidodera puberula*, also found in California and Tahiti, p. 196; *Hyperaspis annularis*, also found in California, p. 205; *Scymnus kinbergi*, p. 209.
51. STAL, C(ARL), Hemiptera: Voyage de "l'Eugénie," Insecta, pp. 219-298, pls. 3 and 4, Stockholm, 1859. (BM)
 The following species described from Honolulu: *Arma patruelis*, p. 220; *Arma pacifica*, p. 221; *Nysius coenosulus*, p. 243; *Capsus pellucidus*, p. 255; *Delphax pulchra*, p. 275; *Bythoscopus viduus*, p. 291.
52. STAL, C(ARL), Orthoptera: Voyage de "l'Eugénie," Insecta, pp. 299-350, Pl. 5, Stockholm, 1860. (BM)
Gomphocerus (Hyalopteryx) plebejus is described from Honolulu, p. 339.
53. OSTEN-SACKEN, Baron, Einführung von Mücken (Culex) auf den Sandwich-Inseln: Stett. Ent. Zeit., vol. 22, pp. 51, 52, 1861. (HSPA)
 Describes the introduction of mosquitoes (Culex), about 1828-30, in an old ship from Mazatlan, Mexico.
54. WALLENGREN, H. D. J., Lepidoptera, Voyage de "l'Engénie," Insecta, pp. 351-390, pls. 6 and 7, Stockholm, 1861. (BM)
 The following species are described from Honolulu: *Colias ponteni*, p. 351; *Heliothis inflata*, p. 376; *Salbia continuatalis*, p. 381.
55. *HAGEN, H. A., Notizen beim Studium von Brauers Novara-Neuropteren: Verb. Zool. bot. Ges. Wien., vol. 17, p. 34, 1867.
 From Oahu are recorded: *Anax strenuus* n.sp. and *Anax junius* n.sp. Specimens of *A. junius* in Berlin Museum are labeled *A. ocellatus*, *A. severus*, and *Alscha prasina*.
56. HOLMGREN, A. E., Hymenoptera, Voyage de "l'Eugénie," Insecta, pp. 391-442, pl. 8, Stockholm, 1868. (BM)
 The following species are described from Honolulu: *Echthromorpha maculipennis*, p. 406, and *Rhygchium nigripenne*, p. 441.
57. SCUDDER, S. H., A century of Orthoptera, Decade 1, Gryllides: Boston Soc. Nat. Hist. Proc., vol. 12, pp. 139-143, Boston, 1868. (BM)
Trigonidium pacificum is described from the Hawaiian Islands, p. 139.

58. THOMSON, C. G., Diptera. *Voyage de l'Eugénie*, Insecta, pp. 443-614, pl. 9, Stockholm, 1868. (BM)
- The following species are described from Honolulu: *Sarcophaga barbata*, p. 533; *Sarcophaga dux*, p. 534; *Sacrophaga pallinervis*, p. 535; *Catapicephala limbipennis*, p. 541; *Musca flavinervis*, var.? p. 547; *Lispe metatarsalis*, p. 562; *Trypetia crassipes*, p. 583.
59. *STAL, CARL, Ennumeratio Hemipterorum I: K. Svenska Vet.-Ak. Handl., vol. 9, pp. 1-121, 1870.
Dysdercus peruvianus Guer. is recorded from Hawaii.
60. WATERHOUSE, C. O., On a new genus and species of Coleoptera belonging to the family Lucanidae, from the Sandwich Islands: Ent. Soc. London Trans., p. 315, 1871.
Mr. Harper Pease sent two specimens of a new beetle from Honolulu, for which Waterhouse created the genus *Apterocyclus*, naming the new species *A. honoluluensis*. These specimens were from the mountains of Kauai.
61. BUTLER, A. G., List of the diurnal Lepidoptera of the South-Sea Islands: Zool. Soc. London Proc., pp. 274-291, pl. 44 (colored), May 5, 1874. (BM)
The following species from the Hawaiian islands are included: *Pyrameis tammeamea* Eschscholtz, p. 284; *Colais ponteni* Wallengren, p. 287; *Papilio sarpedon* Linnaeus, recorded from the Hawaiian islands by Beechey, p. 290. No mention is made of *Vanessa cardui* Linn, which was undoubtedly in the islands. (See 24, 27 and 37.)
62. McLACHLAN, ROBERT, Note on some Odonata (dragon-flies) from the Hawaiian Islands . . . Ent. Month. Mag., vol. 11, p. 92, 1874. (A) (HSPA)
Anax junius Drury, *Pantala flavescens* Fab., and *Tremaea lacerata* Hagen are noted as abundant, and said to prey on the produce of what the Hawaiians call the army worm, a species of Hadena, which occurs in multitudes.
63. *STAL, CARL, Ennumeratio Hemipterorum IV: Svensk. Vet. Ak. Handl., vol. 12, pp. 121 and 152, 1874.
Includes notes on *Nysius caenosulus* and *Pamerla nigriceps* from Hawaii.
64. THRUM, THOMAS, Notes on the history of coffee culture in Hawaiian Islands: Haw. Ann. for 1876, pp. 46-52, 1875. (BM)
Refers to the coffee blight with a discussion of control measures, p. 49.
65. SCUDDER, S. H., A cosmopolitan butterfly, its birthplace and natural history: Amer. Nat., July, 1876. (AF)
Refers to the single citation of *Vanessa cardui* Linn. from the Hawaiian islands, which appeared in the first list of the British Museum Butterflies, where (p. 79) Mr. Doubleday credits four specimens to those islands, two brought by Captain Byron and two by Captain Beechey. Scudder states:
- "I am informed by Mr. Butler that there is now only one specimen in the museum from the Sandwich Islands, and the reference upon the ticket is to the oldest manuscript register, not now to be found. Byron and Beechey were at the islands in 1825-27. Mr. W. T. Brigham informs me that *V. cardui* was not found by Mr. Mann and himself during a twelve month's residence at the islands ten years ago, and I can find no authority for its present existence. Dr. Pickering writes that it was unknown when the Wilkes expedition visited the islands 1840-41. The 'Vincennes,' to which Dr. Pickering was at-

tached, was at the islands from the end of September to the beginning of April. Byron and Beechey's visits were between the latter part of January and the middle of July. Mr. Butler does not consider the specimen in the British Museum, nor the record of Doubleday, sufficient authority to include this insect in his list of South Sea butterflies. Upon the whole, we cannot fairly accept the present authority for the presence of this insect in the Pacific Islands." (See also 24, 27, and 37.)

66. WALLACE, A. R., Geographical distribution of animals, 2 vols., London, 1876.
Contains a brief note on *Apterocyclus* (vol. 1, p. 446).
67. BLACKBURN, THOMAS, Insect-notes from the Sandwich Isles: Ent. Month. Mag., vol. 13, pp. 227-228, London, 1877. (AF)
In discussing his first impressions of the insect fauna of the islands, Blackburn states:
"Coleoptera are distinctly not common; Orthoptera, chiefly earwigs and cockroaches, in considerable variety; a fair number of Hymenoptera; too many Diptera of the mosquito type; a few Hemiptera; and many Lepidoptera, but only two butterflies, a large *Papilio* and *Vanessa kammeamea*."
68. BLACKBURN, THOMAS, Characters of a new genus and descriptions of two new species of Cossonidae from the Sandwich Islands: Ent. Month. Mag., vol. 14, pp. 4-5, London, 1827. (AF)
Anotheorus n.gen., *A. montanus* n.sp., *Oodemas hälticoides*, n.sp. are described.
69. BLACKBURN, THOMAS, Characters of a new genus, and descriptions of new species, of Geodephaga from the Sandwich Islands, I: Ent. Month. Mag., vol. 14, pp. 142-148, London, 1877. (AF)
The following insects are described: *Saronychium* n.gen., *S. inconspicuum*, n.sp., *Anchomenus muscicola* n.sp., *A. epicurus* n.sp., *A. protervus* n.sp., *A. scrupulosus* n.sp., *A. fraternus* n.sp., *A. meticulosus* n.sp., *A. cuneipennis* n.sp., *A. fossipennis* n.sp., *A. oceanicus* n.sp., *A. bardus* n.sp., *A. fugitivus* n.sp., *A. mysticus* n.sp., *Dyscolus tantalus* n.sp., *D. palmae* n.sp., *D. mutabilis* n.sp., *D. caliginosus* n.sp.
70. BUTLER, A. G., List of heterocerous Lepidoptera recently collected by the Rev. T. Blackburn in the Hawaiian Islands: Ent. Month. Mag., vol. 14, pp. 47-50, London, 1877. (AF)
The forms described are: *Deilephila livornica* Esper., *Protoparce cingulata* Fab., *Leucania dislocata* Walker, *Prodenia ingloria* Walker, *Plusia verticillata* Guénée, *Hypena obsoleta* n.sp., *H. insignis* n.sp., *Herminia caeneusalis* Walker, *Botys blackburni* n.sp., *B. accepta* n.sp., *Pyralis achatina* n.sp., *Rhodaria despecta* n.sp., *Hymenia recurvalis* Fab., *Epehestia elutella* Hub., *Argyresthia* sp., *Laverna* sp.
71. WHITE, F. B., Descriptions of new species of heteropterous Hemiptera collected in Hawaiian Islands by Blackburn, No. 1: Annals and Mag. Nat. Hist., 4th ser., vol. 20, pp. 110-114, 1877. (HSPA)
The species described are Cydnidae: *Geotomus substristis* n.sp., *G. jucundus* n.sp.—Anthocoridae: *Tripleps persequeens* n.sp., *Cardiastethus mundulus* n.sp.—Nabidae: *Nabis innotatus* n.sp., *N. subrufus* n.sp., *N. lusciosus* n.sp.—Emesidae: *Luteva insolida* n.sp.—Hebridae: *Merragata* n.gen., *M. hebroides* n.sp.—Corixidae: *Corixa blackburni* n.sp.

72. BLACKBURN, THOMAS, Some observations on the genus Oodemas of the family Cossonidae with descriptions of new species: Soc. Ent. Belgique Ann., pp. 73-76, 1878. (AF)
 The following species are described: *Oodemas nivicola* n.sp., *O. aeneascens* Boh., *O. sculpturatum* n.sp., *O. insulare* n.sp., *O. robustum* n.sp., *O. obscurum* n.sp., *O. angustum* n.sp., *O. mauiense* n.sp., *O. borrei* n.sp., *O. halictoides* Blackb.
73. BLACKBURN, THOMAS, Characters of new genera and descriptions of new species of Geodephaga from the Hawaiian islands, II: Ent. Month. Mag., vol. 15, pp. 119-123 and 156-158, London, 1878. (AF)
 The following are described: *Atrachycnemis*, n.gen., *A. sharpi* n.sp., *Disenochus* n.gen., *D. anomalus*, n.sp., *Anchomenus insociabilis* n.sp., *A. erro* n.sp., *A. sharpi* n.sp., *A. rupicola* n.sp., *Cyclothorax montivagus* n.sp., *C. micans* n.sp., *C. multipunctatus* n.sp., *C. brevis* Sharp, *C. oahuensis* n.sp., *C. simiolus* n.sp., *C. obscuricolor* n.sp.
74. BUTLER, A. G., On Lepidoptera from the Hawaiian islands: Ent. Month. Mag., vol. 14, p. 185, London, 1878. (AF)
 Descriptions are given of the following species: *Danais archippus* Fab., *Leucania dislocata* Walk., *Plusia verticillata* Guénée, *Botys blackburni* Butler, *B. accepta* Butler.
75. SHARP, DAVID, Descriptions of some new species and a new genus of rhyncophorous Coleoptera from Hawaiian Islands: Ent. Soc. London, Trans., for 1878, pp. 15-26, 1878. (AF)
 The following insects were collected by Thomas Blackburn: *Proterhinus vestitus* n.sp., *P. blackburni* n.sp., *P. simplex* n.sp., *P. obscurus* n.sp., *P. oscillans* n.sp., *P. debilis* n.sp., *Dryophthorus squalidus* n.sp., *D. gravidus* n.sp., *D. crassus* n.sp., *D. declivia* n.sp., *D. modestus* n.sp., *D. pusillus* n.sp., *D. insignis* n.sp., *Pentarthrum prolixum* n.sp., *P. obscurum* n.sp., *P. blackburni* n.sp.
76. SHARP, DAVID, On some Nitidulidae from the Hawaiian Islands: Ent. Soc. London, Trans. for 1878, pp. 127-140, 1878. (AF)
 Descriptions are given of the following beetles collected by Blackburn: *Gonioryctus latus* n.sp., *G. blackburni* n.sp., *G. monticola* n.sp., *Brachypeplus discendens* n.sp., *B. puncticeps* n.sp., *B. robustus* n.sp., *B. reitteri* n.sp., *B. infirmus* n.sp., *B. impressus* n.sp., *B. inaequalis* n.sp., *B. omaliooides* n.sp., *B. brevis* n.sp., *B. asper* n.sp., *Carpophilus hemipterus* Linn., *C. dimidiatus* Er., *C. maculatus* Murray, *Haptoncus tetragonus* Murray, and *H. mundus* n.sp.
77. SHARP, DAVID, On some longicorn Coleoptera from the Hawaiian islands: Ent. Soc. London, Trans. for 1878, pp. 201, 210, 1878. (AF)
 Descriptions are given of the following beetles collected by Blackburn: *Parandra puncticeps* n.sp., *Stenocorus simplex* Gyll., *Astrimus* n.gen., *A. obscurus* n.sp., *Sotenus* n.gen., *S. setiger* n.sp., *Clytarlus* n.gen., *C. robustus* n.sp., *C. cristatus* n.sp., *Micracantha nutans* n.sp., *Oopsis nutator* Fab., and *Lagochirus araneiformis* Linn.
78. SHARP, DAVID, Description of new species probably indicating a new genus of Anchomenidae from the Sandwich Islands: Ent. Month. Mag., vol. 14, pp. 179-180, 1878. (AF)
 Describes *Blackburnia insignis* n.sp.

79. TUELY, N. C., Description of new species of butterfly from Sandwich Islands: Ent. Month. Mag., vol. 15, pp. 9-10, 1878. (AF)
Describes *Holochila blackburni* n.sp.
80. TUELY, N. C., Description of the larvae of *Pyrameis hunteri*: Ent. Month. Mag., vol. 15, pp. 16-17, 1878. (AF)
81. WHITE, F. B., Descriptions of new species of heteropterous Hemiptera collected in the Hawaiian islands by the Rev. T. Blackburn, No. 2: Ann. and Mag. Nat. Hist., 5th ser., vol. 1, pp. 365-374, 1878. (HSPA)
The Hemiptera described are Asopidae: *Oechalia patruelis* Stal.—Lygaeidae: *Nysius dallasi* n.sp., *N. delectus* n.sp., *N. arboricola* n.sp., *N. coenosulus* Stal, *Pameria nigriceps* Dall, *Clerada apicornis* Sign., *Reclada* n.gen., *R. moesta* n.sp., *Metrarga* n. gen., *M. nuda* n.sp., *M. villosa* n.sp. Capsidae: *Capsus pellucidus* Stal.—Anthocoridae: *Cardiastethus sodalis* n.sp. Acanthiidae: *Acanthia lectularia* Linn.—Saldidae: *Salda exulans* n.sp.—Nabidae: *Nabis blackburni* n.sp.—Veliidae: *Microvelia vagans* n.sp.
82. BLACKBURN, THOMAS, Characters of new genera and descriptions of new species of Geodephaga from the Hawaiian islands, III: Ent. Month. Mag., vol. 16, pp. 104-109, London, 1879. (AF)
Blackburn describes Anchomenidae: *Anchomenus lucipetens* n.sp., *A. incendiarius* n.sp., *Cyclothorax pele* n.sp., *C. bembidioides* n.sp., *C. paradoxus* n.sp., *C. deverilli* n.sp., *C. vulcanus* n.sp.—Bembidiidae: *Bembidium* (*Lopha*) *ignicola* n.sp.
83. BLACKBURN, THOMAS, *Vanessa cardui* in Hawaii: Ent. Month. Mag., vol. 16, p. 161, London, 1879. (AF)
From the paper by Blackburn the following is quoted:
Referring to the paper headed "The Recent Abundance of *Vanessa cardui*," in the August number of this magazine, it may be of interest to note that I have observed the species in considerable abundance (but not in compact swarms) at various points on the Hawaiian Archipelago, between February and July this year (1879)—though I have not previously noticed it during the three years I have been living on the islands. Its near ally, *V. hunteri*, has occurred in about the usual numbers. The season has been here, probably, as much cloudier and more showery than usual as in Great Britain. *V. cardui* has been recorded, I believe, as occurring on the Hawaiian Islands, but I cannot at this moment lay my hands on the authority. (See 24, 27, 37, and 65.)
84. BUTLER, A. G., On heterocerous Lepidoptera collected in the Hawaiian islands by the Rev. T. Blackburn: Ent. Month. Mag., vol. 15, pp. 269-273, London, 1879. (AF)
The species described are Leucaniidae: *Leucania photophila* n.sp.—Noctuidae: *Agrotis suffusa* W.V., *A. arenivolans* n.sp.—Hydrocampidae: *Oligostigma curta* n.sp.—Botydidae: *Botys accepta* Butl., *B. continuatalis* (*Salbia continuatalis* Wllgr.), *B. demaratalis* Walk., *Mecyna exigua* n.sp.—Larentiidae: *Larentia insularis* n.sp., *Pseudocoremia paludicola* n.sp., *Scotosia rara* n.sp.—Phycidae: *Plodia interpunctalis* Hüb.—Tineidae: *Scardia lignivora* n.sp.
85. SHARP, DAVID, On some Coleoptera from the Hawaiian islands: Ent. Soc. Trans., pp. 77-105, London, 1879. (AF)
Descriptions are given of the beetles collected by Blackburn. They represent Hydrophilidae: *Omicrus* n.gen., *O. brevipes* n.sp., *Hydrophilus semicylin-*

dricus Esch., *Cyclonotum subquadratum* Fairm., *Sphaeridium abdominale* Fab.—*Nitidulidae*: *Brachypeplus tinctus* n.sp., *B. explanatus* n.sp., *B. protinoides* n.sp.—*Cucujidae*: *Monanus* n.gen., *M. crenatus* n.sp.—*Colydiidae*: *Antilissus* n.gen., *A. asper* n.sp.—*Mycetophagidae*: *Litargus vestitus* n.sp., *Propalticus* n.gen., *P. oculatus* n.sp.—*Scarabaeidae*: *Aphodius pacificus* n.sp.—*Cioidae*: *Cis alienus* n.sp., *C. pacificus* n.sp., *C. procatus* n.sp., *C. signatus* n.sp., *C. bicolor* n.sp., *C. tabidus* n.sp., *C. diminutivus* n.sp., *C. laeticulus* n.sp., *C. evanescens* n.sp.—*Aglycyderidae*: *Proterhinus nigricans* n.sp., *P. collaris* n.sp., *P. humeralis* n.sp., *P. pusillus* n.sp., *P. longulus* n.sp., *P. basalis* n.sp., *P. sternalis* n.sp., *P. lecontei* n.sp., *P. paradoxus* n.sp.—*Scolytidae*: *Hypothenemus maculicollis* n.sp.—*Cerambycidae*: *Clytarlus microgaster* n.sp., and *C. modestus* n.sp.

86. SMITH, FREDERICK, Descriptions of new species of aculeate Hymenoptera collected by the Rev. Thos. Blackburn in the Sandwich islands: Linn. Soc. London Journ., vol. 14, pp. 674-685, 1879. (BM)

The species described are as follows: Formicidae: *Camponotus sexguttatus* Fab., *Phenolepis clandestina* Mayr.—Poneridae: *Ponera contracta* Latr.—Myrmicidae *Tetramorium guineense* Fab., *Pheidole pusilla* Heer., *Solenopsis gemmata* Mayr. and Roger.—Sphegidae: *Pelopoeus flavipes* Fab.—Larridae: *Pison iridipennis* n.sp., *P. hospes* n.sp.—Crabronidae: *Crabro affinis* n.sp., *C. mandibularis* n.sp., *C. denticornis* n.sp., *C. unicolor* Smith.—Eumenidae: *Odynerus localis* n.sp., *O. maurus* n.sp., *O. rubritinctus* n.sp., *O. montanus* n.sp., *O. congruus* n.sp., *O. dubiosus* n.sp., *O. agilis* n.sp.—Vespidae: *Polistes aurifer* Sauss.—Andrenidae: *Prosopis blackburni* n.sp., *P. fuscipennis* n.sp., *P. facilis* n.sp., *P. hilaris* n.sp., *P. volatilis* n.sp.—Apidae: *Megachile diligens* n.sp., *Xylocopa aeneipennis* De Geer, and *Apis mellifica* Linn.

87. WATERHOUSE, C. O., Description of a new genus and species of heteromerous Coleoptera of the family Cistelidae from Honolulu: Ent. Month. Mag., vol. 15, pp. 267-268, London, 1879.

The genus and species described are: *Labetis* n.gen., *L. tibialis* n.sp.

88. WHITE, F. B., Descriptions of new Anthocoridae: Ent. Month. Mag., vol. 16, pp. 142-148, London, 1879.

The following are described from Hawaii: *Dilasia denigrata* n.sp., Hawaii, 3,000 feet; *D. decolor* n.sp., Honolulu; *Lilia* n.gen.; *L. dilecta* n.sp., Maui, 5,000 feet.

89. BLACKBURN, THOMAS, and KIRBY, W. F., Notes on species of aculeate Hymenoptera occurring in the Hawaiian islands: Ent. Month. Mag., vol. 17, pp. 85-89, London, 1880. (AF)

The following species are discussed: *Prosopis blackburni* Sm., *P. fuscipennis* Sm., *P. facilis* Sm., *P. hilaris* Sm., *P. volatilis* Sm., *P. flavifrons* n.sp., *Xylocopa aeneipennis* De G., *Apis mellifica* Linn., *Pelopoeus flavipes* Fab., *Odynerus localis* Sm., *O. maurus* Sm., *O. rubritinctus* Sm., *O. blackburni* n.sp., *O. montanus* Sm., *O. congruus* Sm., *O. dubiosus* Sm., *O. agilis* Sm., *Crabro affinis* Sm., *C. mandibularis* Sm., *C. denticornis* Sm., *C. unicolor* Sm., *C. stigius* n.sp., *Pison irridipennis* Sm., *P. hospes* Sm., *Polistes aurifer* Sauss., *Camponotus sexguttatus* Mayr., *Prenolepsis clandestina* Mayr., *Ponera contracta* Latr., *Leptogenys insularis* Sm., *Tetramorium guineense* Fab., *Pheidole pusilla* Heer., *Solenopsis geminata* Fab., *Evania laevigata* Latr.

90. BUTLER, ARTHUR G., On two small consignments of Lepidoptera from the Hawaiian Islands: Ent. Month. Mag., vol. 17, pp. 6-9, London, 1880.

The following species collected by Blackburn are described: *Danais archippus* Fab., *Protoparce blackburni* n.sp., *Deilephila livornica* Esper, *Leucania dislocata* Walk., *L. extranea* Guen., *Prodenia ingloria* Walk., *Caradina venosa* n.sp., *Agrotis suffusa* Gmel., *Spaelotis lucicolea* n.sp., *S. crenata* n.sp., *Heliothis conferta* Walk., *Plusia verticillata* Guen., *Toxocampa noctivolans* n.sp., *Scotosia rara* Butl., *Hypena obsoleta* Butl., *H. insignis* Butl., *H. fascialis* Cram., *Scopula exigua* n.sp., *S. altivolans* n.sp.

91. HAROLD, E. VON, Einige neue Coleopteren: Münchener Ent. Ver. Mitth., vol. 4, pp. 148-181, 1880. (AF)

Von Harold describes *Clytarlus finschi* n.sp. von den Sandwich-Inseln (Finsch!) (p. 166). This species is now in the genus *Plagithmysus*. [J.F.I.]

92. RILEY, C. V., Note: Amer. Ent., vol. 3, p. 150, 1880. (HSPA)

Riley states: Mr. T. Blackburn of Honolulu communicated that *Vanesa cardui* appeared quite frequently in the year 1879, on the island of Hawaii, during the month of February till July. He never before observed the species on the island mentioned above.

93. SHARP, DAVID, On some Coleoptera from the Hawaiian Islands: Ent. Soc. London Trans., pp. 37-54, 1880. (AF)

The following species are described: *Falagria currax* n.sp., *Tachysus pumila* n.sp., *Diestota plana* n.sp., *D. pareva* n.sp., *D. latifrons* n.sp., *D. palpalis* n.sp., *D. puncticeps* n.sp., *D. carinata* n.sp., *D. rufescens* n.sp., *Phlaeopora cingulata* n.sp., *P. diluta* n.sp., *Oligota clavicornis* n.sp., *O. polita* n.sp., *O. glabra* n.sp., *O. mutanda* n.sp., *Liophaena gracilipes* n.sp., *L. flaviceps* n.sp., *Myllaena vicina* n.sp., *M. familiaris* n.sp., *M. curtipes* n.sp., *M. discidens* n.sp., *Pachycorynus discidens* n.sp., *Oxytelus advena* n.sp., *Trogophlaeus senilis* n.sp., *T. frontinalis* n.sp., *T. abdominalis* n.sp., *Glyptoma blackburni* n.sp., *G. brevipenne* n.sp., *Lispinodes explicandus* n.sp.

94. BLACKBURN, THOMAS, Description of four new species of Cossonidae from the Hawaiian Islands: Ent. Month. Mag., vol. 17, pp. 199-201, London, 1881. (AF)

The four species are: *Oodemas olindae* n.sp., *O. substrictum* n.sp., *O. infernum* n.sp., *O. ignarus* n.sp.

95. BLACKBURN, THOMAS, Characters of new genera and descriptions of new species of Geodephaga from the Hawaiian Islands, IV: Ent. Month. Mag., vol. 17, pp. 226-229, London, 1881. (AF)

The following are described: Anchomenidae: *Disenochus terebratus* n.sp., *Anchomenus putealis* n.sp., *Cyclothorax unctus* n.sp., *C. laetus* n.sp., *C. robustus* n.sp.—Bembidiidae: *Bembidium (Notaphus) spurcum* n.sp., *B. teres* n.sp.

96. BUTLER, A. G., On a collection of nocturnal Lepidoptera from the Hawaiian Islands: Annals and Mag. Nat. Hist., 5th ser., vol. 7, pp. 317-333, 1881. (AF) (HSPA)

Descriptions are given of the following species collected by Blackburn: Sphingidae: *Deilephila calida* n.sp.—Larentiidae: *Scotosia corticea* n.sp., *Eupithecia monticolens* n.sp.—Noctuidae: *Spoelotis crinigera* n.sp., *Apameidae chersotoides* n.sp., *A. cinctipennis* n.sp.—Heliothidae: *Heliothis ar-*

migera Hub.—*Hypenidae*: *Hypena obsoleta* Butl., *H. altivolans* Butl., var. *simplex*.—*Hercynidae*: *Boreophila minuscula* n.sp., *Aporodes micacea* n.sp.—*Margarodidae*: *Margaronia glauculalis* Guenée.—*Botididae*: *Anemosia aurora* n.sp., *Mecyna enychiooides* n.sp., *M. nigrescens* n.sp., *M. exigua* Butl., *M. virescens* n.sp.—*Scopariidae*: *Scoparia hawaiensis* n.sp., *S. jucunda* n.sp., var. *formosa*, *S. frigida* n.sp., *S. coarctata* Zeller, *S. venosa* n.sp.—*Phycidae*: *Ephestia humeralis* n.sp., *E. albosparsa* n.sp.

97. CAMERON, PETER, Notes on Hymenoptera, with descriptions of new species: Ent. Soc. London Trans., pp. 555-563, 1881. (AF)

The following species, collected by Blackburn, are described from Honolulu: *Sierola* n.gen., *S. testaceipes* n.sp.—*Braconidae*: *Chelonus carinatus* n.sp., *Monolexis palliatus* n.sp.—*Chalcidae*: *Chalcis polynesiensis* n.sp., and *Crabronidae*: *Crabo polynesiensis* n.sp.

98. KARSCH, F., Zur Käferfauna der Sandwich-Marshall-und Gilberts-Inseln: Berlin Ent. Zeit., vol. 25, pp. 1-14, pl. 1, 1881. (AF) (US)

The following species are recorded from Hawaii: *Acupalpus biseriatus* n.sp., *Platynus planus* n.sp., *Calpodes octoocellatus* n.sp., *Anisodactylus cuneatus* n.sp., *Promecoderus fossulatus* n.sp., *Corymbites coruscus* n.sp., *Elater humeralis* n.sp., *Trypopitys capucinus* n.sp., *Epitragus diremptus* n.sp., *Rhyncolus opacus* n.sp., *Aegosoma reflexum* n.sp., *Stasilea curvicornis* n.sp., *Clytarlus finschi* Har., *C. pulvillatus* n.sp.

99. SHARP, DAVID, On some new Coleoptera from the Hawaiian Islands: Ent. Soc. London Trans., pp. 507-534, 1881. (AF)

Descriptions are given of the following beetles collected by Blackburn: *Nitidulidae*: *Brachypeplus inauratus* n.sp., *B. affinis* n.sp., *B. bidens* n.sp., *B. vestitus* n.sp., *B. metallescens* n.sp., *B. varius* n.sp., *B. guttatus* n.sp., *B. sordidus* n.sp., *B. striatus* n.sp., *B. obsoletus* n.sp., *B. blackburni* n.sp.—*Anobiidae*: *Xyletobius* n.gen., *X. marmoratus* n.sp., *X. nigrinus* n.sp., *X. osculatus* n.sp., *Holcobius* n.gen., *H. granulatus* n.sp., *H. glabricollis* n.sp., *H. major* n.sp., *Mirosternus* n.gen., *M. punctatus* n.sp., *M. obscurus* n.sp., *M. muticus* n.sp., *M. carinatus* n.sp., *M. glabripennis* n.sp., *M. debilis* n.sp., *M. bicolor* n.sp.—*Aglycyderidae*: *Proterhinus hystrix* n.sp., *P. dispar* n.sp., *P. gracilis* n.sp., *P. angularis* n.sp., *P. punctipennis* n.sp., *P. validus* n.sp.—*Cerambycidae*: *Clytarlus pennatus* n.sp., and *C. fragilis* n.sp.

100. WHITE, F. B., Descriptions of new species of heteropterous Hemiptera collected in the Hawaiian Islands by the Rev. T. Blackburn, No. 3: Annals and Mag. Nat. Hist., 5th ser., vol. 7, pp. 52-59, 1881. (HSPA)

The species described are: *Scutelleridae*: *Coleolichus blackburniae* n.sp.—*Lygaeidae*: *Nysius blackburni* n.sp., *N. nitidus* n.sp., *N. nemorivagus* n.sp., *N. rubescens* n.sp., *N. pteridicola* n.sp., *N. vulcan* n.sp., *Cymus calvus* n.sp., *C. criniger* n.sp.—*Anthrocoridae*: *Dilasia denigrata* White, *D. decolor* White, *Lilia dilecta* White.—*Emesidae*: *Ploiaroides* n.gen., *P. whitei* (Blk.M.S.) n.sp.

101. BLACKBURN, THOMAS, Descriptions of the larvae of Hawaiian Lepidoptera: Ent. Month. Mag., vol. 19, pp. 55-56, 1882. (AF)

The species discussed are: *Vanessa tammaemea* Eschscholtz, *Holochila blackburni* Tuely, *Agrotis cremata* Butler and *Rhodaria despecta* Butler.

102. BLACKBURN, THOMAS, Characters of new genera and descriptions of new species of Geodephaga from the Hawaiian Islands, V: Ent. Month. Mag., vol. 19, pp. 62-64, London, 1882. Continued from vol. 17, p. 229.

The following species are described Anchomenidae: *Cyclothora harschi* n.sp., *Acupalpus biseriatus* Karsch, *Platynus planus* Karsch, *Colpodess octocellatus* Karsch, *Anisodactylus cuneatus* Karsch.

103. BLACKBURN, THOMAS, Hawaiian entomology: Haw. Ann. for 1882, pp. 58-61, Honolulu, 1881. (BM)

Blackburn says that Hawaii is a comparatively unexplored field of natural history. His statements may be summarized as follows: The Orthoptera are represented by few species; no true grasshoppers and no Mantidae are known; about 500 species of Coleoptera have been collected, 80 per cent of them apparently native; the Neuroptera (including Odonata) have been little studied; the order Hymenoptera is richer than other orders; ants are numerous, the Madeira house ants, *Pheidole pusilla* Heer, being the most abundant; the Lepidoptera are little known, but about 100 species have been described—not a quarter of those that might be collected; Hemiptera and Homoptera are represented in collections by about 100 species; there are probably hundreds of species of Diptera, but scarcely 50 are represented in collections; mosquitoes, (house) flies, and fleas are pests. Blackburn's paper includes a bibliography of Hawaiian entomology.

104. CHAMBERLAIN, J. E., The *peelua* or army worm of the Hawaiian Islands: Haw. Ann. for 1883, pp. 44-50, Honolulu, 1882. (BM)

A valuable historical paper upon the activities of *Prodenia ingloria* Walk. as a pest of grasses.

105. BORMANS, AUG. DE, Faune orthopterologique des Iles Hawaï ou Sandwich: Genoa Mus. Civ. di St. Nat. Ann., vol. 18, 11 Luglio, pp. 338-348, 1882. (AF) (US)

The following species collected by Blackburn are discussed: Forficulidae: *Anisolabis littorea* White, *A. maritima* Bonelli, *Labia pygidialis* Dub., *Cheilosches morio* Fab., *Forficula hawaiiensis* n.sp.—Blattaria: *Blatta hieroglyphica* Brunn., *Periplaneta decorata* Brunn., *P. ligata* Brunn., *P. americana* Linn., *Eleutheroda dytiscoides* Serv., *Panchlora surinamensis* Linn., *Oniscosoma pallida* Brunn., *Euthyrrapha pacifica* Coquebert.—Locustodea: *Elimaea appendiculata* Brunn., *Conocephalus blackburni* n.sp. Grylloidea: *Gryllus innotabilis* Walk., *Trigonidium pacificum* Scud.

106. BUTLER, A. G., On a small collection of Lepidoptera from the Hawaiian Islands: Ent. Soc. London Trans., pp. 31-45, 1882. (AF)

Descriptions are given of the following Lepidoptera collected by Blackburn: Lycaenidae: *Polyommatus boeticus* Linn.—Leucaniidae: *Leucania extranea* Guenée.—Gonopteridae: *Gonitis hawaiiensis* n.sp.—Hypocalidae: *Hypocala velans* Walk.—Pyralidae: *Locusta monticolens* n.sp.—Steniidae: *Metasia abnormis* n.sp., *Scatomera hydrophila* n.sp.—Botididae: *Mestalobes* n.gen., *M. aeone* n.sp., *M. simaethina* n.sp., *M. semiochrea* n.sp., *Scopula constricta* n.sp.—Scopariidae: *Scoparia coarctata* Zell.—Crambidae: *Eromene bella* Hubn.—Tortricidae: *Teras illepida* n.sp., *Proteoptynx walsinghamii* n.sp.—Tineidae: *Tinea simulans* n.sp.—Elachistidae: *Laverna parda* Butler, var. *montivolans*, *L. aspersa* n.sp.—Pterophoridae: *Platyptilus litoralis* n.sp.

107. WHITNEY, H. M., The cane borer: Haw. Planters' Monthly, vol. 1, pp. 145-146, Honolulu, 1882. (BM) (HSPA)
A popular economic article—recommends burning.
108. BUTLER, A. G., On a small series of Lepidoptera from the Hawaiian Islands: Ent. Month. Mag., vol. 19, pp. 176-180, London, 1883. (AF)
The following species are described: *Scotorythra* n.gen., *S. arboricolens* n.sp.—*Pyrales*: *Scopula litorea* n.sp., *Orthomccyna* n.gen., *O. albicaudata* n.sp., *O. exigua*, var. *cupreipennis*, *Melanomecyna* n.gen., *M. stellata* n.sp., *Gesneria floricolens* n.sp.—*Tineina*: *Depressaria* sp., *Azinis hilarella* Walk.
109. CAMERON, PETER, Descriptions of new genera and species of Hymenoptera: Ent. Soc. London Trans., pp. 187-193, 1883. (AF)
Descriptions are given of the following Hymenoptera collected by Blackburn: Chalcididae: *Epitranus lacteipennis* n.sp., *Moranila* n.gen., *M. testaceiceps* n.sp., *Solindena* n.gen., *S. picticornis* n.sp., *Eupelmus flavipes* n.sp.—Evaniiidae: *Evania sericea* n.sp.—Ichneumonidae: *Limneria polynesiensis* n.sp., *L. blackburni* n.sp., *Ophion lineatus* n.sp., *O. nigricans* n.sp.
110. McLACHLAN, ROBERT, Neuroptera of the Hawaiian Islands: Annals and Mag. Nat. Hist., 5th ser., vol. 12, pp. 226-240, 1883. (HSPA)
Descriptions are given of the following neuropteroid insects collected by Blackburn: Termitidae: *Calotermes castaneus* Burm., *C. marginipennis* Latr.—Embidae: *Oligotoma insularis* n.sp.—Psocidae: *Psocus* sp., *Elipsocus vinosus* n.sp., *Odonata*, *Pantala flavescens* Fab., *Tramea lacerata* Hagen, *Leptthemis blackburni* n.sp., *Anax junius* Drury, *A. strenuus* Hagen, *Agrion xanthomelas* Selys, *A. hawaiiensis* n.sp., *A. pacificum* n.sp., *A. deceptor* n.sp., *A. calliphya* n.sp., *Megalagrion* n.gen., *M. blackburni* n.sp., *M. oceanicum* n.sp.
111. McLACHLAN, ROBERT, Neuroptera of the Hawaiian Islands, Part II, Planipennia, with general summary: Annals and Mag. Nat. Hist., 5th ser., vol. 12, pp. 298-303, 1883. (HSPA)
This paper includes descriptions of neuropteroid insects collected by Blackburn: Hemerobiidae: *Megalomus* sp.—Chrysopidae: *Anomalochrysa* n.gen., *A. hepatica* n.sp., *A. rufescens* n.sp., *Chrysopa microphya* n.sp., *C. oceanica* Walk.—Myrmeleontidae: *Formicaleo perjurus* Walk.
112. MEYRICK, EDWARD, Notes on Hawaiian Microlepidoptera: Ent. Month. Mag., vol. 20, pp. 31-36, 1883. (AF)
Descriptions are given of the following moths collected by Blackburn: Conchylidae: *Heterocossa achroana* n.sp.—Gelechiidae: *Depressaria indecora* Butl., *Thyrocopa* n.gen., *T. (Depressaria) usitata* Butl., *Synomotis* n.gen., *S. epicapna* n.sp., *Automola* n.gen., *A. pelodes* n.sp., *Parasia sedata* Butl., *Diplosara* n.gen., *D. (Sardia) lignivora* Butl.—Tineidae: *Blabophanes longella* Walk.
113. SMITH, W. O., Cane borer: Planters' Monthly, vol. 2, pp. 56-57, Honolulu, 1883. (HSPA)
This is a popular article, which includes suggestive discussion of control measures.

114. WHITE, F. B., Report on the pelagic Hemiptera procured during the voyage of H.M.S. "Challenger," in the years 1873-76: Rept. Voyage H.M.S. "Challenger," Zoology, vol. 7, 82 pp., 3 pls. (2 col.), London, 1883. (BM)
 Describes *Holobates sericeus* Esch., the principal species occurring in the waters about Hawaii. (See pp. 47-48, Pl. 1, fig. 7.)
115. BLACKBURN, THOMAS, Notes on some Hawaiian Carabidae: Ent. Month. Mag., vol. 21, pp. 25-26, London, 1884. (AF)
 Discusses Atrachynemis, Anchomenus muscicola Blackb., and Mauna n.gen. created for the insect hitherto called *Blackburni frigida* Blackb.
116. BLACHBURN, THOMAS, Notes on Hawaiian Neuroptera with descriptions of new species: Annals and Mag. Nat. Hist. 5th ser., vol. 14, pp. 412-421, 1884. (HSPA)
 The species described are: Odonata: *Odryon satelles* n.sp., *A. oahuense* n.sp., *A. nigro-hamatum* n.sp., *A. koelense* n.sp., *A. pacificum* MacL.—Hemerobiidae: *Megalomus* spp.—Chrysopidae: *Anomalochrysa maclachlani* n.sp., *A. montana* n.sp., *A. ornatipennis* n.sp.
117. KIRBY, W. F., On the Hymenoptera collected during the recent expedition of H.M.S. "Challenger": Annals and Mag. Nat. Hist., 5th ser., vol. 13, p. 402, 1884. (HSPA)
 This paper includes the following references to Hawaiian insects: Evaniiidae *Evania laevigata* Latr. (p. 403).—Vespidae *Polistes aurifer* Sauss. (p. 410), *P. carnifex* Fab. (p. 411).
118. OSTEN-SACKEN, C. R., Facts concerning the importation or non-importation of Diptera into distant countries: Ent. Soc. London Trans., pp. 489-496, 1884. (AF)
 These interesting historical notes relate to the introduction of the night mosquito, *Culex quinquefasciatus* Say.
119. SHARP, DAVID, On some genera of the subfamily Anchomenini (Platynini Horn.) from the Hawaiian Islands: Ent. Month. Mag., vol. 20, pp. 217-219, London, 1884. (AF)
 The following genera are discussed: Metromenus n.gen., Colpodiscus n.gen., Barypristus n.gen., Blackburni, Disenochus, Atrachynemis and Cy-clothorax.
120. BLACKBURN, THOMAS, and SHARP, DAVID, Memoirs on the Coleoptera of the Hawaiian Islands: Roy. Dublin Soc. Trans., 2d ser., vol. 3, pp. 119-290, pls. 4 and 5, 1885. (BM) (AF) (HSPA)
 This resumé of knowledge of the Coleoptera of Hawaii includes descriptions of the following new genera and species: Dytiscidae: *Coplatus mauiensis* n.sp.—Staphylinidae: *Bolitochara impuncta* n.sp., *Diestota montana* n.sp., *D. incognita* n.sp., *Myllaena pacifica* n.sp., *M. oahuensis* n.sp., *Oligota kauaiensis* n.sp., *O. longipennis* n.sp., *O. simulans* n.sp., *O. variegata* n.sp., *O. prolixa* n.sp., *Lithocharis incompta* n.sp., *Oxytelus bledioides* n.sp., *Lispinodes quadratus* n.sp., *L. pallescens* n.sp.—Corylophidae: *Corylophus rotundus* n.sp., *C. suturalis* n.sp., *Sericoderus basalis* n.sp., *S. pubipennis* n.sp., *Orthoperus aequalis* n.sp.—Histeridae: *Bacanius atomarius* n.sp., *B. confusus* n.sp., *Acritus insularis* n.sp., *Aeletes longipes* n.sp., *A. concentricus* n.sp., *A.*

monticola n.sp., *A. facilis* n.sp.—Nitidulidae: *Gonioryctus fugitivus* n.sp., *G. similis* n.sp., *Brachypeplus olinda* n.sp., *B. torvus*, n.sp., *B. koelensis* n.sp., *B. floricola* n.sp., *B. celatus* n.sp., *B. apertus* n.sp., *B. quadracallis* n.sp., *B. parallelus* n.sp., *B. expers* n.sp., *B. spretus* n.sp., *B. bicolor*, n.sp., *B. discedens* Sh.var., *kauaiensis* n.var., and *B. blackburni* Sh.var. *laniensis* n.var.—Colydiidae: *Eulachus hispidus* n.sp.—Cucujidae: *Brontolaemus* n.gen., *B. elegans* n.sp., *Laemorphloeus aeneus* n.sp., *Monanus brevicornis* n.sp., *Telephanus insularis* n.sp., *T. pallidipennis* n.sp.—Crytophagidae: *Telmatophilus debilis* n.sp.—Erotylidae: *Euxestus minor* n.sp., *Eidoreus* n.gen., *E. minutus* n.sp.—Coccinellidae: *Scymnus vividus* n.sp., *S. ocellatus* n.sp., *S. descendens* n.sp.—Dermestidae: *Attagenus plebeius* n.sp., *Labrocerus* n.gen., *L. jaynei* n.sp., *L. concolor* n.sp., *L. obscurus* n.sp., *Cryptorhopalum brevicorne* n.sp., *C. terminale* n.sp.—Eucnemidae: *Fornax bonvouloiri* n.sp., *F. sculpturatus* n.sp., *F. parallelus* n.sp., *F. longicornis* n.sp., *F. obtusus* n.sp.—Elateridae: *Eopenthes* n.gen., *E. basalis* n.sp., *E. obscurus* n.sp., *E. debilis* n.sp., *E. konae* n.sp., *E. ambiguus* n.sp., *E. satelles* n.sp., *Itodacnus* n.gen., *I. gracilis* n.sp.—Malacodermidae: *Helcogaster pectinatus* n.sp., *Caccodes* n.gen., *C. debilis* n.sp.—Ptinidae: *Xyletobius insignis* n.sp., *X. affinis* n.sp., *X. serricornis* n.sp., *X. lineatus* n.sp., *Catorama pusilla* n.sp., *Mirosternus acutus* n.sp.—Bostrichidae: *Bostrichus migrator* n.sp.—Cioidae: *Cis bimaculatus* n.sp., *C. nigrofasciatus* n.sp., *C. longipennis*, n.sp., *C. apicalis* n.sp., *C. setarius* n.sp., *C. concolor* n.sp., *C. chloroticus* n.sp., *C. calidus* n.sp., *C. insularis* n.sp., *C. roridus* n.sp., *C. attenuatus* n.sp., *C. ephistemooides* n.sp., *C. vagepunctatus* n.sp.—Tenebrionidae: *Platydema obscurum* n.sp., *Sciophagus* n.gen. for *Heterophaga pandanicola* Esch., *Labetes tibialis* Wat., *Cistela crassicornis* n.sp., *Anthicus mundulus* n.sp., *Ananca collaris* n.sp.—Agyleridae: *Proterhinus linearis* n.sp., *P. scutatus* n.sp., *P. similis* n.sp., *P. laticollis* n.sp., *P. tarsalis* n.sp., *P. robustus* n.sp., *P. ineptus* n.sp., *P. integer* n.sp., *P. detritus* n.sp., *P. longicornis* n.sp., *P. insignis* n.sp.—Curculionidae: *Rhyncognon* n.gen., *R. blackburni* n.sp., *R. vestitus* n.sp., *Acalles lateralis* n.sp., *A. duplex* n.sp., *A. angusticollis* n.sp., *A. mawiensis* n.sp., *A. ignotus* n.sp., *A. decoratus* n.sp., *Chaenosternum* n.gen., *C. konanum* n.sp., *Hyperomorpha* n.gen., *H. squamosa* n.sp., *Calandra remota* n.sp., *Oodemas tardum* n.sp., *O. aequale* n.sp., *O. crassicornis* n.sp., *Heteramphus* n.gen., *H. wollastoni* n.sp., *H. foveatus* n.sp., *H. hirtellus* n.sp., *H. cylindricus* n.sp., *Pseudolus* n.gen. for *Rhyncolus longillus* Boh., *Dolichotelus* n.gen., *D. apicalis* n.sp.—Scolytidae: *Xyleborus obliquus* n.sp., *X. truncatus* n.sp., *X. rugatus* n.sp., *X. insularis* n.sp., *X. immaturus* n.sp., *X. frigidus* n.sp., *Hypothenemus griseus* n.sp.—Anthribidae: *Mauia* n.gen., *M. satelles* n.sp.—Cerambycidae: *Clytarlus blackburni* n.sp., *C. filipes* n.sp.

121. HAGEN, H. A., Monograph of the Embidina: Can. Ent., vol. 17, pp. 141-155, 1885. (HSPA) (AF) (UH)
Records *Ologotoma insularis* McLachl., in alcohol, from Honolulu, taken in a private garden greenhouse. (See p. 143.)
122. MEYRICK, EDWARD, Descriptions of New Zealand Micro-lepidoptera VII, Tortricina: N. Zeal. Inst. Trans., vol. 17, pp. 141-149 (1885). (BM)
Chiloïdes straminea Butl., originally described from Hawaii, is here recorded also in New Zealand (p. 142).
123. *REUTER, O. M., Monographia anthocoridarum orbis terrestis: Acta Soc. Sci. Fenn., vol. 14, pp. 555-758, 1885.
124. SHARP, DAVID, Note on the genus *Plagithmysus* Motsch.: Soc. Ent. Belg. Bull. for 1885, pp. LXXIV-LXXV (Compt. rend.), 1885.
This paper clears up the synonymy of this genus.

125. BLACKBURN, THOMAS, and CAMERON, PETER, On the Hymenoptera of the Hawaiian Islands: Manchester Lit. Soc. Mem., ser. 3, vol. 10, pp. 194-244, 1886. (BM)

This excellent paper includes the following descriptions: Anthophila: Andrenidae: *Prosopis fuscipennis* Smith, *P. satellus* n.sp., *P. blackburni* Smith, *P. facilis* Smith, *P. flavifrons* Kirby, *P. kona* n.sp., *P. coniceps* n.sp., *P. rugiventris* n.sp., *P. hilaris* Smith, *P. volatilis* Smith, *P. anthracina* Smith, *P. flavipes* Smith.—Apidae: *Megachile diligens* Smith, *Xylocopa aeneipennis* De Geer.—Fossores: Vespidae: *Polistes aurifer* Sauss, *P. hebraeus* Fab., *Odynerus radula* Fab., *O. extraneus* Kirby, *O. nigripennis* Holmgren, *O. dromedarius* n.sp., *O. vulcanus* n.sp., *O. hawaiiensis* n.sp., *O. haleakalae* n.sp., *O. congrius* Smith, *O. dubiosus* Smith, *O. rubritinctus* Smith, *O. blackburni* Kirby, *O. montanus* Smith, *O. cardinalis* n.sp., *O. pacificus* n.sp., *O. rubropustulatus* n.sp., *O. obscure-punctatus* n.sp., *O. diversus* n.sp., *O. agilis* Smith, *O. insulicola* n.sp.—Crabronidae: *Crabro affinis* Smith, *C. mauensis* n.sp., *C. distinctus* Smith, *C. mandibularis* Smith, *C. polynesianus* Cameron, *C. abnormalis*, n.sp., *C. unicolor* Smith, *C. stygius* Kirby, *C. adspectans* n.sp., *C. rubro-caudatus* n.sp.—Larridae: *Pison iridipennis* Smith, *P. hospes* Smith.—Sphegidae: *Pelopaeus caementarius* Drury, *Mimesa antennata* Smith.—Heterogena: Formicidae: *Camponotus sexguttatus* Fab., *Tapinoma melanocephala* Fab., *Prenolepis longicornis* Latr., *P. obscura* Mayr.—Poneridae: *Ponera contracta* Latr., *Leptogenys insularis* Smith.—Myrmicidae: *Monomorium specularis* Mayr, *Tetramorium guineense* Fab., *Pheidole megacephala* Fab., *Solenopsis geminata* Fab.—Oxyura: *Scleroderma polynesianus* Saunders, *Sierola testaceipes* Cameron, *S. monticola* n.sp., *S. leuconeura* n.sp.—Terebrantia: Ichneumonidae: Pimplidae, *Echthromorpha maculipennis* Holmgren, *E. flavo-orbitalis* n.sp., *Pimpla hawaiiensis* n.sp.—Tryphonidae: *Metacaelus femoratus* Grav.—Ophionidae: *Ophion lineatus* Cameron, *O. nigricans* Cameron, *Limneria polynesianus* Cameron, *L. blackburni* Cameron, *L. hawaiiensis* n.sp.—Braconidae: *Chelonus blackburni* Cameron, *Monolexis? palliatus* Cameron.—Evanidae: *Evania sericea* Cameron, *E. laevigata* Latr.—Chalcididae: *Epitrurus lacteipennis* Cameron, *Chalcis polynesianus* Cameron, *Spalangia hirta* Haliday, *Moranila testaceipes* Cameron, *Solindenia picticornis* Cameron, *Eupelmus flavipes* Cameron, *Encyrtus insularis* n.sp.

126. WALKER, J. J., *Anosia plexippus* Linn. (*Danais archippus* Fabr.): A study in geographical distribution: Ent. Month. Mag., vol. 22, pp. 217-224, London, 1886. (AF)

Walker states that *Anosia plexippus*, "unobserved by the early voyagers to the Sandwich Islands, it is now abundant and firmly established there." (p. 219).

127. CAMERON, PETER, Note on the Hymenoptera of the Hawaiian Islands: Ent. Month. Mag., vol. 23, p. 195, London, 1887. (AF)

The species discussed are: *Odynerus nautarum*=*O. insulicola* Sm., *Odynerus sandwichensis*=*O. rubritinctus* Sm.

128. BAILEY, EDWARD, The flora and fauna of the Hawaiian Islands: Haw. Ann. for 1888, pp. 49-54, Honolulu, 1887.

Contains a brief interesting account of the insects of the islands.

- 129 *BIGOT, J. M. F., Diptères nouveaux ou peu connus, 3^e partie, XLI. Tachinidae: Soc. Ent. France Ann., ser. 6, vol. 8, pp. 77-101, 1888.

Chaetogaedia monticola is described.

130. BLACKBURN, THOMAS, Notes on the Hemiptera of the Hawaiian Islands: Linn. Soc. N. S. W. Proc., 2d ser., vol. 3, pp. 343-354, 1888. (BM) (HSPA) (AF)

The following species are included: Scutatinae: *Aechalia* sp., *Coleotrichus* sp., *Geotomus subtristis* White, and *G. jucundus* White.—Lygaeinae: *Nysius longicollis* n.sp., *N. mauiensis* n.sp., *N. whitei* n.sp., *Metrarga contracta* n.sp., *M. obscura* n.sp., *Capsina* sp.—Anthrocorina: *Acanthia lectularia* L., *Cardiastethis* sp., *Lilia* sp., *Dilasia* sp.—Emesidae: *Ploiaroides rubromaculata* n.sp., *P. pulchra* n.sp.—Nabinae: *Nabis rubritinctus* n.sp., *N. oscillans*, n.sp., *N. innotatus* White, *N. koelensis* n.sp., *N. subrufus* White, *N. curtipennis* n.sp.—Saldinae: *Salda oahuensis* n.sp.

131. MEYRICK, EDWARD, On Pyralidina of the Hawaiian Islands: Ent. Soc. London Trans., pp. 209-246, 1888. (AF) (US)

The material for this extensive list of moths was collected by Blackburn during his six-years' residence in the islands, 1877-1883. Some interesting notes on origin and distribution are included. The list follows: Pyralididae: *Asopia gerontialis* Walk.—Hydrocampidae: *Paraponyx linaelis* Gn.—Botyidae: *Margarodes exaula* n.sp., *Omiodes blackburni* Butl., *O. (Botys) accepta* Butl., *O. (Salbia) continuatalis* Wallgr., *O. (Botys) demaratalis* Walk., *O. monogona* n.sp., *O. liodyta* n.sp., *O. (Botys) localis* Butl., *Zinckenia recurvalis* F., *Scopula eucrena* n.sp., *S. (Locasta) monticolans* Butl., *S. (Aporodes) micacea* Butl., *S. (Mecyna) nigrescens* Butl., *S. (Mecyna) ennychioides* Butl., *S. (Melanomecyna) stellata* Butl., *S. argoscelis* n.sp., *S. (Rhodaria) despектa* Butl., *Protocletis* n.gen., *P. (Scopula) constricta* Butl., *Mecyna (Anemosa) aurora* Butl., *M. virescens* Butl., *Orthomecyna albicaudata* Butl., *O. (Mecyna) exigua* Butl., *O. aphanopsis* n.sp., *Mestolobes (Metasia) abnormis* Butl., *M. semiocrea* Butl., *M. minuscula* Butl., *Eurycreon litorea* Butl.—Scopariidae: *Scoparia frigida* Butl., *Xerocopa venosa* Butl., *X. melanopsis* n.sp., *X. ambrodes* n.sp., *X. demodes* n.sp., *X. ischnias* n.sp., *X. hawaiensis* Butl., *X. pachysema* n.sp., *X. mesoleuca* n.sp., *X. (Scoparia) formosa* Butl., *X. (Scoparia) jacunda* Butl.—Pterophoridae: *Trichoptilus (Acitilia) hawaiensis* Butl., *Platyptilia rhynchosphora* n.sp., *P. cosmodactyla* Hb., *P. brachymorpha* n.sp., *P. (Platyptilus) littoralis* Butl.—Crambidae: *Eromene ocellae* Hw., *Hednota (Gesneria) floricolens* (rect. *floricolans*) Butl., *H. (Scotomera) hydrophila* Butl., *H. oxyptera* n.sp.—Phycitidae: *Ephestia (Plodia) interpunctella* Hb., *E. desuetella* Walk., *E. eulella* Hb., *Homoeosoma (Ephestia) humeralis* Butl., *Genophantis* n.gen., *G. iodora* n.sp.—Galleriidae: *Achroea grisella* F.

132. RILEY, C. V., A Sandwich Island sugar-cane borer, *Sphenophorus obscurus* Boisd.: Insect Life, vol. 1, pp. 185-189, illus., 1888. (HSPA) (UH) (BM)

This paper gives a description of the several stages of development with references to the literature.

133. DALLA TORRE, K. W. v., Hymenopterologische Notizen: Wien. Ent. Zeit., vol. 8, p. 124, 1889. (HSPA)

Contains the following note: "*Odynerus cardinalis* Blackb. u. Cam. 1886) non Mor. (1885)=*O. rudolphi* M."

134. KALAKAUA REX, An act relating to the suppression of plant diseases, blight, and insect pests: Laws of the Hawaiian Islands, chap. 2, 1890.

Section 2 relates to the prevention of introduction of any plant disease, blight, or insect pests injurious to vegetation, and extermination of such as

were already established. Section 3 deals specifically with the landing of plants or soil by the masters of vessels entering Hawaiian ports and makes provision for inspection. Section 4 provides for destruction of imported plants or other material found to be infested. Section 5 requires every person to immediately report infestation of vegetation wherever discovered. Section 6 provides for the enactment of further regulations preventing the introduction and spread of plant diseases, blight, and insect pests.

135. COQUILLETT, D. W., *Icerya* in Honolulu: *Insect Life*, vol. 3, p. 329, 1891.

Icerya is said to have made its appearance in the Hawaiian islands during the spring of 1889, but widely distributed in 1890—in about 50 gardens in Honolulu. The pest is thought to have come in on fruit from California. The predaceous Vedalia beetle was introduced from California, and by November, 1890, *Icerya* was rare.

136. RILEY, C. V., Rept. of the Ent., Rept. U. S. Dept. Agric. to Sec. Agric., p. 234, 1891.

Mr. Koebele left specimens of *Chilocorus bivulnerus* at Honolulu, while on his way from California to Sydney.

137. RILEY, C. V., and HOWARD, L. O., Introduction of *Icerya* into Honolulu: *Insect Life*, vol. 3, p. 307, 1891. (HSPA)

Refers to the introduction of *Icerya* from California and its successful control by introducing the Vedalia.

138. McLACHLAN, ROBERT, Supplementary note on the Neuroptera of the Hawaiian Islands: *Annals and Mag. Nat. Hist.*, 6th ser., vol. 10, pp. 176-178, 1892. (HSPA)

McLachlan suggests that *Deielia fasciata* Kirby is probably a mistaken locality—since this dragon fly does not occur in Hawaii (p. 177). A new Myrmeleonidae, *Formicaleo wilsoni* n.sp., from Lanai, is described.

139. KALAKAUA REX, An act to establish a bureau of agriculture and forestry: *Laws of the Hawaiian Islands*, Chapter 81, Sec. 4, 1892.

The act provides for guarding against the introduction of plant diseases or insect pests and the suppression of those already affecting agricultural products and live stock.

140. WARREN, W., Description of new genera and species of Pyralidae: *Annals and Mag. Nat. Hist. Ann.*, ser. 6, vol. 9, pp. 429-442, 1892.

A new genus, *Loxocreon*, is created for Meyrick's *Omiodes* of the Hawaiian islands. Type *L. continuatalis* Wllngrn. (*Salbia*).

- 140a. KOEBELE, ALBERT, Studies of parasitic and predaceous insects in New Zealand, Australia, and adjacent islands: U. S. Dept. Agric., [Report No. 51] Washington, 1893. (BM)

Work in Honolulu is referred to on page 5 and again on page 11, where the following pests are discussed: *Dactylopius* spp., *Pulvinaria psidii* Mask., *Lecanium acuminatum* Sign., *L. depressum* Sign., and *L. longulum* Dougl. The introduction of *Cryptolaemus montrouzieri* Muls. and *Rhizobius* spp. is recommended. Koebele further states that a number of *Chilocorus bivulnerus* Muls. were turned loose in good condition. He also found internal parasites preying upon the various species of *Lecanidae* in

Honolulu, and one of these he took to California in considerable numbers, liberating them in an orange orchard infested with *Lecanium oleae* Burm. and *L. hesperidum* Linn. A few species of Scymnids and *Coccinella abdominalis* Say. were also found. These insects are discussed also on page 23, where it is stated that the *Coccinella abdominalis* was sent to California and liberated on *Lecanium hesperidum* Linn.; and that three small Scymnids were found among the insects sent from Honolulu.

141. MASKELL, W. M., Further coccid notes: with descriptions of new species from Australia, India, Sandwich Islands, Demerara, and South Pacific: N. Zeal. Inst. Trans., vol. 25, pp. 201-252, pls. 11-18, 1893.
The following Hawaiian species are described: *Lecanium acuminatum* Sign., *L. longulum* Dougl., *Pulvinaria psidii* n.sp., *Sphaerococcus bambusae* n.sp.
142. RILEY, C. V., and HOWARD, L. O., An injurious Hawaiian beetle (*Adoretus umbrosus*): Insect Life, vol. 6, p. 43, 1893. (HSPA) (UH)
This species was first noticed in Hawaii about 1891 and in 1893 it had already become a serious pest, riddling the leaves of many trees and plants.
143. THRUM, THOMAS, Bureau of Agriculture and Forestry: Haw. Ann. for 1894, pp. 92-94, Honolulu, 1893. (BM) (PL) (UH)
Refers to the engagement of Prof. A. Koebele to study the blight and insect enemies of vegetation and to discover remedies for them. Mentions consignments of coccinellids and toads from California.
144. DYAR, H. G., Preparatory stages of *Lephygama flavimaculata* Harv., and other notes: Can. Ent., vol. 26, pp. 65-69, 1894. (HSPA) (AF) (UH)
Includes description of all stages.
145. COOPER, ELWOOD, Address of the president: Calif. Sta. Bd. Hort., 4th Bien. Rept. 1893-4, pp. 240-250, Sacramento, 1894. (HSPA) (AF)
Refers to the engagement of Koebele by the Hawaiian Government to search for parasites in Australia (p. 246).
146. CRAW, ALEXANDER, Entomology and quarantine: Calif. Sta. Bd. Hort., 4th Bien. Rept. 1893-4, pp. 79-109, Sacramento, 1894, (US) (HSPA) (AF)
Records oleanders from Honolulu infested with scale, *Aspidiotus* sp. (pp. 79-80).
147. THRUM, THOMAS, Coffee outlook in Hawaii: Haw. Ann. for 1895, pp. 65-68, Honolulu, 1894, (BM)
A brief discussion of coffee blight and its control by introduced insects.
148. BRUNNER, V. WATTENWYL, On the Orthoptera of the Sandwich Islands: Zool. Soc. London Proc., pp. 891-897, 1895. (BM) (AF) (US)

The following species are included: Dermaptera: *Anisolabis littorea* White, *A. maritima* Bon., *A. pacifica* Erichs., *A. annulipes* Luc., *Labia pygidiata* Dubr., *Chelisoches morio* Fab., *Forficula hawaiensis* Borm.—Blattodea: *Phyllodromia heiroglyphica* Brun., *P. obtusata*, n.sp., *Stylopyga decorata* Brun., *Methana ligata* Brun., *Periplaneta americana* L., *Eleutheroda dytiscoides* Serv., *Leucophaea surinamensis* Fab., *Oniscosoma pallida* Brun., *Euthyrrapha pacifica* Conqueb.—Acridiodea: *Oxya velox* Fab.—Locustodea: *Elimaea appendiculata* Brun., *Brachymetopa discolor* Redtenb., *B. blackburni* Borm., *B. deplanata* n.sp., *B. nitida* n.sp., *Xiphidium fuscum* Fab.—Grylloidea: *Gryllus innotabilis* Walk., *G. poeyi* Sauss., *Paratrigonidium pacificum* (Scudd.), *P. atroferrugineum* n.sp., *Prognathogryllus* n.gen. ex tribu Proscirtium, *P. alatus* n.sp., *P. forficularis* n.sp.; the last two figured.

149. COCKERELL, T. D. A., Notes on the geographical distribution of scale insects: U. S. Nat. Mus. Proc., vol. 17, pp. 615-625, 1895. (BM) (UH)

The following are included from Hawaii (p. 621): *Dactylopius citri*, *Lecanium hesperidum*, *L. depressum*, *L. oleae*, *L. acuminatum*, *Asterolecanium pustulans*, *Pulvinaria psidii*, and *Sphaerococcus bambusae*. Only the last two were originally described from Hawaiian specimens.

150. COCKERELL, T. D. A., Miscellaneous notes on Coccidae: Can. Ent., vol. 27, pp. 253-261, 1895. (HSPA) (US)

Mentions *Asterolecanium pustulans* (Ckll.) on oleander from Honolulu (p. 259).

151. DYAR, H. G., Preparatory stages of *Phlegethonius cingulata* (*Sphinx convolvuli*): Ent. News, vol. 6, p. 95, 1895. (AF) (UH) (HSPA)

Includes descriptions of all stages.

152. KOEBELE, ALBERT, Report of the entomologist: Republic of Hawaii, Min. of Interior, Rept. for 1894, pp. 98-104, Honolulu, 1894. (US)

The report discusses injurious insects in Hawaii. Koebele says that though these are numerous they may be controlled by introducing natural enemies. He mentions some of the principal scale pests and reviews the numerous species of ladybird beetles sent from California to prey upon them.

153. MARDEN, JOSEPH, Blights and insect pests: Republic of Hawaii, Min. Int. Rept. for the nine months ending Dec. 31, 1894, pp. 31-38, Honolulu, 1895.

This paper lists about three dozen species of Coccinellidae which were successfully sent from Australia and liberated in Hawaii to prey upon plant lice, scale insects, and red spiders. Control measures are discussed for the Japanese beetle (Adoretus) with suggestions for the introduction of moles, bats, and toads. Notes a suggestion from University of California that the caneborer (*Rhabdocnemis obscurus* Boisd.) is a native of New Ireland, and that this island is the place to search for parasites. Discusses the damage done by this pest in Fiji.

154. MARDEN, JOSEPH, Blights and insect pests: Report to commissioners of Agriculture and Forestry: Rept. Min. Int. Repub. Haw., for 1895, pp. 118-120, 1896.

Records a marked decrease in scale pests, due to the introduction of natural enemies. This is particularly true in regard to the coffee scale, which

is said to be a thing of the past. The Japanese beetle is reported troublesome, also the red spider (*Tetranychus telarius*) on coffee, and cutworms on the canaigre plant.

155. MASKELL, W. M., Synoptical list of Coccidae reported from Australasia and the Pacific Islands up to December, 1894: N. Zeal. Inst. Trans., vol. 27, pp. 1-35, 1895. (BM)

The following are mentioned from Hawaii: *Aspidiotus aurantii* Mask., *A. longispina* Morg., *A. nerii* Bouché, *Diaspis boisduvalii* Sign., *D. rosae* Sandb., *Mytilaspis flava* Targioni-Tozzetti, var. *hawaiiensis* Mask., *M. pallida* Green, var. (?) Mask., *M. pomorum* Bouché, *Chionaspis* (?) *biclavis* Comst., var. *detecta* Mask., *C. prunicola* Mask., *Lecanium acuminatum* Sign., *L. longulum* Dougl., *L. nigrum* Niet., var. *depressum* Targioni-Tozzetti, *L. oleae* Bern., *Pulvinaria mammeae* Mask., *P. psidii* Mask., *Dactylopius vastator* Mask., *Sphaerococcus bambusae* Mask., *Icerya purchasi* Mask.

156. MASKELL, W. M., Further coccid notes with description of new species from New Zealand, Australia, Sandwich Islands, and elsewhere, and remarks upon species already reported: N. Zeal. Inst. Trans., vol. 27, pp. 36-75, pls. 1-7, 1895. (BM)

The following species concern Hawaii: *Aspidiotus longispina* Morg., *Diaspis boisduvalii* Sign., *Mytilaspis pallida* Green, *M. flava* Targioni-Tozzetti, *Chionaspis prunicola* n. sp., *C. biclavis* Comst., var. *detecta* n. var., *Pulvinaria mammeae* n. sp., *Dactylopius vastator* n. sp.

157. SHARP, DAVID, Cambridge Natural History, vol. 5, Insects, part 1, pp. 83-584, and vol. 6, Insects part 2, pp. 1-625, London, 1895. (BM) (UH)

In part 1, reference is made to *Oligotoma insularis* (p. 354) and to the numerous chrysopides in Hawaii (p. 471). The peculiarities of Hawaiian Odonata are discussed (pp. 425-426). In part 2, the Hawaiian bees (*Prosopis*, pp. 21-22) and the peculiarities of Hawaiian wasps (*Odynerus*, pp. 76-77) are discussed.

158. TRYON, HENRY, New cane varieties and new diseases: The Planters' Monthly, vol. 14, pp. 449-459, Honolulu, 1895.

Discusses the distribution of the beetle-borer (*Rhabdocnemis obscurus* Boisd.). This New Guinea borer is said to occur also in New Ireland, Tahiti, Fiji, and Hawaii.

159. ALFKEN, J. D., Zur Insectenfauna der Hawaiischen und Neuseeländischen Inseln. Ergebnisse einer Reise nach dem Pacific (Schauinsland 1896-7): Zool. Jahrb., 19 Band, Heft 5 (1903). (BM) (HSPA)

Includes notes on the various insects collected on the Hawaiian islands, including Laysan.

160. ALFKEN, J. D., Neue Orthopteren von Neuseeland und der Hawaiischen Inseln, nebst kritischen Bemerkungen zu einigen bekannten Arten. Ergebnisse einer Reise nach dem Pacific (Schauinsland 1896-7): Abh. nat. Ver. Bremen, vol. 17, pp. 141-152 (1901). (BM)

Paranemobius n.gen. and *P. schauinslandi* n.sp. are described (p. 145).

161. COCKERELL, T. D. A., A check-list of the Coccidae: Ill. Sta. Lab. Nat. Hist. Bull. 4, pp. 318-339, 1896. (HSPA)
 Lists the following from Sandwich Islands: *Dactylopius vastator* Mask. (p. 326), *Sphaerococcus bambusae* Mask. (p. 329), *Pulvinaria mammeae* Mask. (p. 330), *Mytilaspis flava*, var. *hawaiensis* Mask. (p. 336).
162. CRAW, ALEXANDER, A list of scale insects found upon plants entering the port of San Francisco: U. S. Dept. Agric. Div. Ent. Bull. 4, Tech. ser., pp. 40-41, 1896. (AF) (UH)
 The following are listed from Honolulu: *Aspidiotus nerii* Bouché, on palms; *Asterolecanium pustulans* Ckll., on oleander; *Ceroplastes rubens* Mask., on Asplenium fern; *Diaspis patellaeformis* Sasak., on shrub; *Dactylopius albiziae* Mask., on orange; *Icerya purchasi* Mask., on rose; *Lecanium hesperidum* Linn., on orange; *Lecanium longulum* Dougl., on *Carica papaya*; *Lecanium perforatum* Newst., on palms; *Lecanium tessellatum* Sign., on ferns; *Lecanium oleae* Bern., on deciduous magnolia; *Pulvinaria psidii* Mask., on ferns, orange, coffee, pomegranate and avocado.
163. CRAW, ALEXANDER, Injurious insect-pests found on trees and plants from foreign countries: Calif. Sta. Bd. Hort., 5th Bien. Rept. for 1895-6, pp. 33-55, pls. 6-8, Sacramento, 1896. (US)
 The following references to Hawaii: *Chionaspis delecta* Mask. (p. 37), *Diaspis patellaeformis?* Sasak. (p. 39), *Planchonia (Asterolecanium) pustulans* Cock. (p. 43), *Ceroplastes rubens* Mask. (p. 44), *Lecanium nigrum* Niet., *L. perforatum* News, and *L. tessellatum* Sign. (p. 46), *Pulvinaria psidii* Mask., and *Adoretus umbrosus* Z. (p. 47).
164. CRAW, ALEXANDER, Entomology and quarantine: Calif. State Bd. Hort., 5th Bien. Rept. for 1895-6, pp. 127-135, Sacramento, 1896. (US)
 Includes the following references to Hawaii: *Lecanium longulum* Doug., taken on papaws (*Carica papaya*), and *Ceroplastes rubens* Mask. on ferns (pp. 127-8), and the mongoose (p. 135).
165. HOWARD, L. O., and MARLATT, C. L., The San Jose scale: U. S. Dept. Agric., Div. Ent. Bull. 3, n. ser., pp. 1-80, 1896. (HSPA)
 Mr. Koebele found this scale on the island of Kauai upon prune and peach trees imported from California, some trees having been utterly destroyed by the scale and others badly infested.
166. KORBELE, ALBERT, Report on insect pests: Haw. Planters' Monthly, vol. 15, pp. 590-598, Honolulu, 1896. (HSPA) (US)
 The following pests are discussed and suggestions given for their control: the cane borer, *Sphenophorus obscurus* Boisd.; the coffee borer, *Aegosoma reflexum* Karsch.; the coconut pyralid, *Botys* sp.; the cut-worm, *Lasphygma frugiperda* Hub.; the mole cricket, *Gryllotalpa* sp.; the sugarcane mealy bug, *Dactylopius calceolaria* Mask.; and plant lice, *Aphis* sp.
167. MARLATT, C. L., Insect control in California: U. S. Dept. Agric. Yearbk., pp. 217-236, 1896. (BM)
 Includes a reference to the introduction of *Cryptolaemus montrouzieri* Muls., which had been very successful in Hawaii in ridding coffee plantations of *Pulvinaria psidii* (p. 226).

168. PERKINS, R. C. L., A collecting trip on Haleakala, Maui, Sandwich Islands: Ent. Month. Mag., 2d ser., vol. 7, pp. 190-195, 1896. (BM) (AF)

169. SHARP, DAVID, On Plagithmysus, a Hawaiian genus of longicorn Coleoptera: Ent. Month. Mag., vol. 32, pp. 237-240, 241-245, 271-274, London, 1896.

The following species are described: *Plagithmysus vitticollis* n. sp., *P. newelli* n. sp., *P. concolor* n. sp., *P. solitarius* n. sp., *P. cuneatus* n. sp., *P. (Clytarlus) finschi* Har., *P. pulverulentus* Motsch., *P. bishopi* n. sp., *P. vicinus* n. sp., *P. bilineatus* n. sp., *P. lanaensis* n. sp., *P. perkinsi* n. sp., *P. varians* n. sp., *P. darwinianus* n. sp., *P. (Clytarlus) blackburni* Sharp, *P. sulphurescens* n. sp., *P. speculifer* n. sp., *P. aestivus* n. sp., *P. funebris* n. sp., *P. aequalis* n. sp., *P. arachnipes* n. sp., *P. (Clytarlus) cristalus* Sharp.

170. TOWNSEND, C. H. T., Some Mexican and Japanese injurious insects liable to be introduced into the United States: U. S. Dept. Agric. Div. Ent. Bull. 4, Tech. ser., pp. 9-25, 1896.

Includes several brief references to species occurring in the Sandwich Islands.

171. COCKERELL, T. D. A., San Jose scale and its nearest allies: U. S. Dept. Agric., Bur. Ent. Bull. 6, Tech. ser., 1897. (UH)
Morganella n. subg. is proposed for *maskelli* n. sp. (p. 22).

172. COCKERELL, T. D. A., Food plants of scale insects: U. S. Nat. Mus. Proc., vol. 19, pp. 725-785, 1897. (BM)
Most of the Hawaiian species are included in this extensive list.

173. COQUILLETT, D. W., Revision of the Tachinidae of America north of Mexico: U. S. Dept. Agric., Bur. Ent. Bull. 7, Tech. ser., 1897. (UH)

Chaetogaedia monticola Bigot is recorded from Hawaii, pp. 11 and 137.

- 173a. GUPPY, H. B., On the summit of Mauna Loa: Nature, vol. 57, p. 21, London, Nov. 4, 1897.

174. HAMPSON, G. F., On the classification of two subfamilies of moths of the family Pyralidae: the Hydrocampinae and Scoparianae: Ent. Soc. London, Trans., pp. 127-240, 1897. (HSPA)

The following references are given to Hawaiian species: on p. 227—*Xeroscopra melanopsis* Meyr., *X. ombrodes* Meyr., *X. ichnias* Meyr., *X. demodes* Meyr., *X. pachysema* Meyr., *X. mesoleuca* Meyr., *X. venosa* Butl., *X. hawaiiensis* Butl., *X. fucunda* Butl.; on p. 229—*Mestolobes abnormis* Butl., *M. minuscula* Butl., *M. semiochrea* Butl.; on p. 233—*Scoparia frigida* Butl., and *S. montana* Butl.

175. KOEBELE, ALBERT, Report of the entomologist of the Hawaiian Government: Haw. Planters' Month., vol. 16, pp. 65-85, Honolulu, 1897. (BM) (US) (HSPA)

This valuable paper deals with the work of Koebele from the time of appointment to December 31, 1896. Report is made upon the success of the introduced Australian ladybird beetle, *Crytolaemus montrouzieri* Muls., in controlling the following scale insects: *Dactylopius vastator* Mask., *D. ceri-*

ferus News., *D. chalceolariae* Mask., *D. adonidum* Linn., and *Pulvinaria psidii* Mask. Other scale insects mentioned are: *Aspidiotus aurantii* Mask., *A. longispina* Morg., *A. duplex* Cock., *A. camelliae* Sign., *A. nerii* Bouché, and several species of this genus; *Parlatoria zizyphi* News., *P. pergandei* Comst., *Mytilaspis citricola* Pack., *M. gloverii* Pack., *M. pallida* Green, *M. flava* Targ.-Toz., *M. pomorum* Bouché, *Diaspis rosae* Sandb., *D. boisduvalii* Sign., *Chionaspis biclavis* Comst., *C. eugeniae* Mask., *C. prunicola* Mask., *Diaspis patelliformis* Sasaki, *D. amygdali* Tryon, *Fiorinia camelliae* Comst., *Ceroptastes rubens* Mask., *C. ceriferus* Ander., *C. floridensis* Comst., *Lecanium acuminatum* Sign., *L. filicum* Boisd., *L. hemisphaericum* Targ.-Toz., *L. coffeea* Niet., *L. hesperidum* Linn., *L. longulum* Doug., *L. mori* Sign., *L. nigrum* Niet., *L. oleae* Bern., *L. tessellatum* Sign., *Pulvinaria mameae* Mask., *Eryococcus araucariae* Mask., and *Icerya purchasi* Mask., also other undetermined coccids present in the islands. About 200 species of ladybirds had been introduced to prey upon the scale insects, also two species of fungi destructive to all the Lecanidae. Remarking upon the introduced Coccinellidae, Koebele says that only 3 species were present in Blackburn's time: *Coccinella abdominalis* Say, *Scymnus ocellatus* Sharp, and *S. vividus* Sharp, and that these were evidently introduced very early. Extensive notes are given upon the habits of the various other exotic species introduced by the author. Of the other introduced predators and parasites Koebele mentions syrphids and chrysopid flies as established, and says *Chalcis obscurata* Walk. is active against various pyralid and tortricid larvae. Mention is also made of the introduction of bats from California—600 of which reached Hawaii alive but were apparently not established. Toads from California and frogs from Japan reproduced freely. Among cutworms the *Agrotis ypsilon* Rott., *A. saucia* Hbn., *Lecania unipuncta* Haw., *Plusia verticillata* Guen., *Laphygma frugiperda* Hbn., are mentioned; these have few parasites. Coffee trees are reported badly infested by a white fly, *Aleurodes* sp.; natural enemies of these were introduced. *Adoretus umbrosus* F., probably introduced from Japan in soil, was reported from Oahu, Maui, and Kauai. These insects will be controlled by the fungus in the wet districts. Notes are given on life history, food plants, and natural enemies, with full discussion of the experiments with fungus. The small green tineid larvae destructive to the leaves of sweet potatoes (native "ponallo") and the somewhat allied *Plutella cruciferarum* Z. are mentioned briefly.

176. MASKELL, W. M., Further coccid notes with new species and discussion of points of interest: N. Zeal. Inst. Trans., vol. 29, pp. 293-331, pls. 18-22, 1897. (BM)
The species described which concern Hawaii are: *Chionaspis eugeniae* Mask and *Ceroptastes rubens* Mask.
177. MASKELL, W. M., On a collection of Coccidae, principally from China and Japan: Ent. Month. Mag., vol. 33, pp. 239-244, London, 1897. (AF) (HSPA)
The following species are recorded from Hawaii: *Aspidiotus cydoniae* Comst., on casuarina; same, var. *tecta*, n. var., on ohia trees; *Aspidiotus longispina* Morg., on kukui trees; *Lecanium hesperidum* Linn., on papaya and on ohia trees.
178. PERKINS, R. C. L., The introduction of beneficial insects in the Hawaiian Islands: Nature, vol. 55, pp. 499-500, 1897. (BM)
This article deals principally with scale insects and the reasons for the success of their introduced natural enemies. Perkins says: "Few countries have been more plagued by the importation of insect pests than the Hawai-

ian Islands; in none have such extraordinary results followed the introduction of beneficial species to destroy them."

179. PERKINS, R. C. L., Notes on *Oligotoma insularis* McLach. (Embiidae) and its immature conditions: Ent. Month. Mag., 2d ser., vol. 8, pp. 56-58, London, 1897. (BM) (AF)
Discusses development and habits.
180. *PERKINS, R. C. L., Notes on some Hawaiian insects: Phil. Soc. Cambridge Proc., vol. 9, pp. 373-380, 1897.
181. SHARP, DAVID, On *Plagithmysus*, a Hawaiian genus of longicorn Coleoptera: Ent. Month. Mag., vol. 33, suppl. p. 12, London, 1897. (AF) (HSPA)
Description given of *Plagithmysus albertisi* n. sp., collected in West Honolulu by Signor d'Albertis in 1874.
182. WALSINGHAM, LORD, Western equitorial African Microlepidoptera: Ent. Soc. London Trans., pp. 33-67, pls. 2, 3, 1897.
Describes *Monopis* Hb. (*Blabophanes Z.*) *longella* Wlk. recorded from the Hawaiian islands (Honolulu).
183. ALFKEN, J. D., *Megachile schauinslandi* n.sp. Eine neu Megachile-art aus Honolulu: Ent. Nachr., vol. 24, pp. 340-341, 1898. (HSPA)
184. CLARK, B. O., Official bulletin of the Bureau of Agriculture: The Hawaiian, vol. 1, p. 6, Honolulu, Aug. 13, 1898.
The Hawaiian was a weekly newspaper which started February 12, 1898, its object being to advertise the islands. Mr. Clark, then secretary and commissioner of the Hawaiian Bureau of Agriculture, edited a page dealing with agricultural subjects. The only complete file, so far as known is owned by Mrs. B. J. Mesick, 2029 Beckley Street, Honolulu, widow of the editor, L. H. Mesick. This, the first reference dealing with the melon fly (*Dacus curbitae* Coq.) in Hawaii or elsewhere, consists of correspondence. A letter dated August 8, 1898, from L. C. Swain, Laupahoehoe, Hawaii, described this new pest, which he had observed affecting pumpkins, squashes, beans, tomatoes, and watermelons. Mr. Clark, in his reply gave the life history of the flies, which he had observed carefully the previous year near Honolulu; he also suggested measures of control.
A complete copy of this correspondence appears in Haw. Agric. Exp. Sta. Rept. for 1907, pp. 30-31, also in U. S. Dept. Agric. Bull. 491, pp. 57-58, 1917.
185. COCKERELL, T. D. A., The Coccidae of the Sandwich Islands: Ent., vol. 31, pp. 239-240, London, 1898.
The species described are: *Icerya purchasi* Mask., *Sphaerococcus bambusae* Mask., *Asterolecanium pustulans* Ckll., *Dactylopius citri* Riss., *D. albizziae* Mask., *D. vastator* Mask., *D. virgatus* Mask. (syn. *ceriferus* Newst.), *Ceroplastes rubens* Mask., *Lecanium nigrum* Nietn., *L. nigrum*, var. *depressum* Targ., *L. hesperidum* L., *L. oleae* Bern., *L. acuminatum* Sign., *L. longulum* Dougl., *Pulvinaria mammeae* Mask., *P. psidii* Mask., *Aspidiotus aurantii* Mask., *A. longispina* Morg., *A. hederae* Vall., var. *nerii* Bouché, *A. cydoniae* Comst., *A. maskelli* Ckll., *A. persearum* n. sp. *A. perniciosus* Comst., *Mytilaspis gloverii* Pack., *M. hawaiiensis* Mask., (as var. of *flava*), *M. pomorum* Bouché, *M. pallida* Green, var. *maskelli* Ckll., *Howardia biclavis* Comst., var.

detecta Mask., *Chionaspis prunicola* Mask. (syn. of *Diaspis amygdali* Tryon), *C. eugeniae* Mask., *Fiorinia floriniae* Targ., *Aulascaspis boisduvalii* Sign., *A. rosae* Bouché.

186. HAMPSON, G. F., A revision of the moths of the superfamily Pyraustinae and family Pyralidae: Zool. Soc. London Proc., pp. 590-761, 1898.

The following Hawaiian species are included: *Nacoleia blackburni* Butl., *N. accepta* Butl., *N. continentalis* Wllgrn., *N. demaratalis* Wlk., and *N. localis* Butl. (p. 699).

187. HOWARD, L. O., On some new parasitic insects of the subfamily Encyrtinae: U. S. Nat. Mus. Proc., vol. 21, pp. 231-248, 1898. (BM)

Blepyrus marsdeni n. sp. is described from Honolulu (p. 234).

188. KIRBY, W. F., Description of a new genus of Odonata: Annals and Mag. Nat. Hist., 7th ser., vol. 2, pp. 346-348, 1898. (HSPA)

Describes *Nesogonia* n.gen., *N. blackburni* McL. Also published in Haw. Planters' Mo. vol. 17, pp. 208-219 and 258-269, Honolulu, 1898. (BM) (US) (HSPA).

189. KOEBELE, ALBERT, Report of Prof. Albert Koebele, Entomologist of the Hawaiian Government: Rept. Min. Int. Repub. Haw. for 1897, pp. 105-137, Honolulu, 1898. (BM) (US) (HSPA)

Most of this report is a repetition of the valuable report presented by this author the previous year (see No. 175). New matter, starting on page 130, deals with natural enemies of pests observed in California, Arizona, and Mexico.

190. MASKELL, W. M., Further coccid notes with descriptions of new species and discussion of points of interest: N. Zeal. Inst. Trans., vol. 30, pp. 219-252, 1898. (BM)

Includes a discussion of *Aspidiotus cydoniae* Comstock, var. *tecta* n. var., from Hawaii (p. 224).

191. MAXWELL, WALTER, The Hawaiian Islands: U. S. Dept. Agric. Yearbook for 1898, pp. 563-582, 1899.

Includes a brief note on quarantine against insect pests and plant diseases and a letter from Mr. Koebele (p. 574).

192. ALFKEN, J. D., Die Xylocopa-art der Hawaiian Islands: Ent. Nachr., vol. 25, pp. 317-318, 1899. (HSPA)

The introduced bee, commonly known in Hawaii as *Xylocopa aeneipennis* Deg., is here considered to be the Asiatic species, *X. chloroptera* Lep.

193. BRIGHAM, W. T., Hawaiian feather work: B. P. Bishop Mus. Mem., vol. 1, No. 1, Honolulu, 1899.

Contains interesting references to the development of kahilis and their relation to house flies.

194. COCKERELL, T. D. A., The Coccidae of the Sandwich Islands: Ent., vol. 32, pp. 93, 164, 1899. (AF)

Discussed the distribution of what were considered endemic Hawaiian species, namely: *Kermicus* (formerly *Sphaerococcus*) *bambusae*, which also

occurs in Ceylon, Mauritius, and Brazil; *Dactylopius vastator*, also found in Mauritius; and *Mytilaspis hawaiiensis*, which has been found at Amoy, China. The following are to be added to the Hawaiian list: *Aspidiotus (Evaspidiotus) transparens* Green, A. (*Hemiberlesia*) *greeni* Ckll., and a young Icerya, indeterminable. Cockerell adds the following species from Koebele's report to his list of Hawaiian coccids: *Dactylopius calceolariae* Mask., *D. adonidum* Linn. (but probably *citri*), *Eriococcus araucariae* Mask., *Ceroplastes ceriferus* Anders., *C. floridensis* Comst. (these two often introduced but not established), *Lecanium hemisphaericum* Targ., *L. mori* Sign., *L. tessellatum* Sign., *Parlatoria zizyphis* Luc., *P. proteus*, var. *pergandei* Comst., *Mytilaspis beckii* E. Newman (*M. citricola* Pack.), *Aspidiulus rapax* Comst., *A. duplex* Ckll. (p. 164). There are also mentioned two unidentified species of *Pulvinaria*.

195. *COCKERELL, T. D. A., A check-list of the Coccidae. First supplement: Ill. Sta. Lab. Nat. Hist. Bull. 5, pp. 389-398, 1899.
196. COUILLETT, D. W., A new trypetid from Hawaii: Ent. News, vol. 10, pp. 129-130, 1899.
Describes *Dacus cucurbitae* n.sp.: two males and two females bred by George Compere from larvae in green cucumbers.
197. EMERY, CARLOS, Ergebnisse einer Reise nach dem Pacific (Schauinsland 1896-97), Formiciden: Zool. Jahrb., vol. 12, Syst., pp. 438-440, 1899. (HSPA)
Describes four species of ants collected from Laysan: *Monomorium gracillimum* F.Sm., *Tetramorium guineense* Fabr., *Tapinoma melanocephalum* Fabr., *Ponera punctatissima* Rog., *schaunislandi* n.subsp.
198. FOREL, AUGUST, Heterogyna (Formicidae): Fauna Haw., vol. 1, pp. 116-122, 1899.
199. HAUGHS, DAVID, Insect pests and diseases: Report Commissioner of Agriculture: Rept. Min. Int. Repub. Haw. for bien. period ending 1899, pp. 120-123, Honolulu, 1900. (US) (AF)
Consists of a report by Professor Koebele of a trip to Australia in search of parasites, primarily for the cane-borer. The Mediterranean fruit fly is noted as a bad pest in Australia, a condition which led to a quarantine of Australian fruit. Other exotic fruit flies are also discussed.
200. *HOWARD, L. O., Economic status of insects as a class: Sci., n.s., vol. 9, p. 241, 1899.
201. KIRKALDY, G. W., Eine neue hawaiische Fulgoriden-Gattung und Art: Ent. Nachr., vol. 25, p. 359, 1899. (HSPA)
Phalainesthes n.gen., *P. schauinslandi* n.sp., are described from Hilo.
202. KOEBELE, ALBERT, Report of the entomologist: Republic of Hawaii, Min. of Int., Rept. for 1898, pp. 84-87, Honolulu, 1899. (US) (AF)
Records the introduction of the hornfly, *Haematobia irritans* Linn.
203. *KONINGSBERGER, J. C., Erste overzicht der schadelijke en nuttige insecten van Java: Mededeelingen uit 's lands plantentuin, vol. 22, pp. 1-53, 1899.

204. MEYRICK, EDWARD, Macrolepidoptera: Fauna Hawaiensis, vol. 1, pp. 123-275, pls. 3-7, 1899.
 This is the most extensive work on this group; it includes descriptions of many new species.
205. PERKINS, R. C. L., Hymenoptera aculeata: Fauna Hawaiensis, vol. 1, pp. 1-122, pls. 1, 2, 1899.
 This is the most extensive work on this group; it contains descriptions of many new species.
206. PERKINS, R. C. L., Orthoptera: Fauna Hawaiensis, vol. 2, pp. 1-30, pls. 1, 2, 1899.
 This is the most extensive work on Orthoptera; it contains descriptions of many new species.
207. PERKINS, R. C. L., Neuroptera: Fauna Hawaiensis, vol. 2, pp. 31-89, pls. 3-5, 1899.
 This is the most extensive work on Neuroptera; it contains descriptions of many new species.
208. SCHAUINSLAND, H., Drei Monate auf einer Korallen-Insel (Laysan), Bremen, 1899. (HSPA)
 The insects listed are Lepidoptera: Noctuidae: *Apamea chersotoides* Butl., *Spaelotis crinigera* Butl.—Pyralidae: *Zinckenia recurvalis* F., also an undetermined tineid.—Hemiptera: *Nabis* sp.—Hymenoptera: *Chelonus cameroni* D.T. (=*carinatus* Cam.).—Coleoptera: *Dermestes domesticus* Garm., *Clytus crinicornis* Chevr., *Silvanus surinamensis* Linn., *Tribolium ferrugineum* Fab., also an abundance of roaches, *Periplaneta* (pp. 102-103). The flies and ants are not included in this paper.
209. ASHMEAD, W. H., Notes on some New Zealand and Australian parasitic Hymenoptera: Linn, Soc. N.S.W. Proc., vol. 25, pp. 327-360, 1900.
 Describes the Pteromalid, *Tomocera californica*, parasite for *Lecanium oleae*, p. 345.
210. DYAR, H. G., Larvae from Hawaii—a correction: Can. Ent., vol. 32, pp. 156-158. (HSPA) (AF) (UH)
Spodoptera mauritia Boisd. is described as *Laphygma flavimaculata* Harv. in Can. Ent., vol. 26, p. 65, 1894. Other caterpillars described are: *Lycaena boetica* Linn., *Plusia chalcites* Esp., and *Omiodes blackburni* Butl. It is also noted that *Sphinx convolvuli* is the insect described as *Phlegethonius cingulata* in Ent. News, vol. 6, p. 95.
211. *FRANK, A. B., and KRUEGER, F., Schildlausbuch . . . Berlin, p. 120, 1900.
 Records *Aspidiotus perniciosus* from Hawaii, p. 70.
212. HOWARD, L. O., A dipterous enemy of cucurbits in the Hawaiian Islands: U. S. Dept. Agric., Div. Ent. Bull. 22, n.ser., pp. 93-94, 1900.
 Specimens were received March 13, 1899, from George Compere, Honolulu, of what is locally known as the melon fly. This was pronounced by Coquillett to be a new species, to which he gave the name, *Dacus cucurbitae*.

213. KOEBELE, ALBERT, Report: Haw. Sugar Planters' Exp. Sta. Rept., pp. 40-42, 1900. (US)

Records an examination of the dying roots of sugarcane: no organic disease could be found, though the epidermis of roots had been broken, probably by wind.

214. KOEBELE, ALBERT, Diseases of the cane: The Planters' Monthly, vol. 19, pp. 519-524, 1900.

Discusses the distribution, food plants, habits, and control measures of the sugar cane beetle borer, *Rhabdozemis obscurus*; also includes brief notes on the pyralid moth *Omiodes accepta* Butl.

215. KOEBELE, ALBERT, Report of Prof. Albert Koebele, entomologist: Rept. Comr. Agric. and Forestry for 1900, pp. 36-49, 1901. (US)

Koebele reports the introduction of parasites from California for *Pieris rapae*, *Plutella cruciferarum*, and various cutworms. Salamanders were also brought over. Notes Lecanidae kept in check now by many ladybirds; other predators and parasites sent from Fiji and Australia. A brief review of exotic fruit flies is included, with remedies. Fuller's rose beetle, *Aramigus fulleri* Horn, is found to be the same as the so-called Olinda bug. A tineid larva of cotton bolls (*Geleckia gossypiella* Sndrs.) is reported; a tortricid, also bred from cotton bolls, and a common beetle, *Araocerus fasciculatus* De.G. Japanese beetles are reported from all parts of the islands. Suggestions on various phases of the production of silk as an industry for the islands terminates this paper.

216. KOEBELE, ALBERT, Destruction of forest trees: Rept. Comr. Agric. and Forestry Hawaii, for 1900, pp. 50-60, 1901. (US)

Discusses the depredation of insects on forest trees of Hawaii. *Icerya purchasi* Mask. is under control, the ladybird beetle, *Vedalia cardinalis*, being abundant. Other scale insects mentioned are *Lecanium nigrum* Neit, *L. longulum* Doug., and *Pulvinaria psidii* Mask. which are also well checked by introduced natural enemies. The same is said in regard to the mealy bugs, *Dactylopius ceriferus* News., on *Erythrina monosperma*. Notes on the span worm, *Scotorythra idolias*, a tortricid, and on a Bruchus destructive to the seed of the koa tree. The list of Cerambycid beetles noted includes: *Plagithmysus varians* Shp., *P. pulverulentus* Motsch., *P. cristatus* Shp., *P. aequalis* Shp., *P. arachnipes* Shp., *P. darwinianus* Shp., *P. blackburni* Shp., *P. funebris* Shp., *P. bilineatus* Shp., *P. bishopi* Shp. *P. vicinus* Shp., *P. collaris* Shp., *P. diana* Shp., *P. finschi* Har. *P. pulvillatus* Karsch, *P. lanaensis* Shp., *P. aestivus* Shp., *P. concolor* Shp., *P. permundus* Shp., *P. perkinsi* Shp., *P. lamarckianus* Shp., *Clytarlus filipes* Shp., *C. mediocris* Shp., *C. debilis* Shp., *C. claviger* Shp., *C. nodifer* Shp., *C. modestus* Shp., *C. laticollis* Shp., *C. pennatus* Shp., *C. fragilis* Shp., *C. longipes* Shp., *C. annectens* Shp., and *Callithmysus microgaster* Shp. Koebele considers the worst pest of the native forest to be cattle (pp. 57-59).

217. KOEBELE, ALBERT, Notes on insects affecting the koa trees . . .: Rept. Bd. Comr. Agric. and Forestry, Hawaii, 1900, pp. 61-66, 1901, (US)

The insects noted are: *Parandra puncticeps* Sharp, *Aegosoma reflexum* Karsch in the dead wood of the decaying forest. The living trees affected by the "Olinda bug," *Pandamorus olindae* Perk., by tortricid and geometrid larvae, and by a fungoid disease.

218. KOEBELE, ALBERT, Hawaii's forest foes: Haw. Ann. for 1901, pp. 90-97, Honolulu, 1900.
Discusses causes of the disappearing forests of the islands, describing the various species of insects that attack trees, with their natural enemies.
219. MEYRICK, EDWARD, New Hawaiian Lepidoptera: Ent. Month. Mag., vol. 36, pp. 257-258, 1900. (HSPA) (AF)
The specimens described were collected by Professor Schauinsland. *Agrotis eremoides* n.sp. and *A. procellaris* n.sp., were obtained at Laysan, and *Scotorythra diceraunia* n.sp., *S. triscia* Meyr., *Phlyctaenia synastra* Meyr. came from Molokai.
220. *PERKINS, R. C. L., Introduction of beneficial insects into the Hawaiian Islands: Berlin Ent. Zeit., pp. 45-46, 1900.
This is a resumé of an article that appeared in Nature, vol. 55, pp. 499-500, 1897.
221. PERKINS, R. C. L., Coleoptera, Rhynchophora, Proterhinidae, Heteromera, and Cioidae: Fauna Hawaiensis, vol. 2, pp. 117-270, pls. 7-10, 1900.
The most extensive work dealing with these groups; it contains descriptions of many new species.
222. SHARP, DAVID, Coleoptera Phytophaga: Fauna Hawaiensis, vol. 2, pp. 91-116, pl. 6, 1900.
The most extensive work on this group; it contains descriptions of many new species.
223. THOMAS, W. B., Farming in Hawaii: Haw. Ann. for 1901, pp. 124-128, 1900. (BM)
Includes a brief reference to insect pests which are said to make it almost impossible to grow certain vegetables (p. 127).
224. VAN DINE, D. L., A partial bibliography of Hawaiian entomology: U. S. Dept. Agric., Office Exp. Stations Bull. 170, pp. 52-59, 1906.
225. BALL, S. C., Migration of insects to Rebecca Shoal Light-Station and the Tortugas Islands, with special references to mosquitoes and flies: Carnegie Inst. Wash., Pub. No. 252, pp. 193-212, 1918.
Contains an interesting note on the observation of house flies migrating long distances in a small boat (p. 208).

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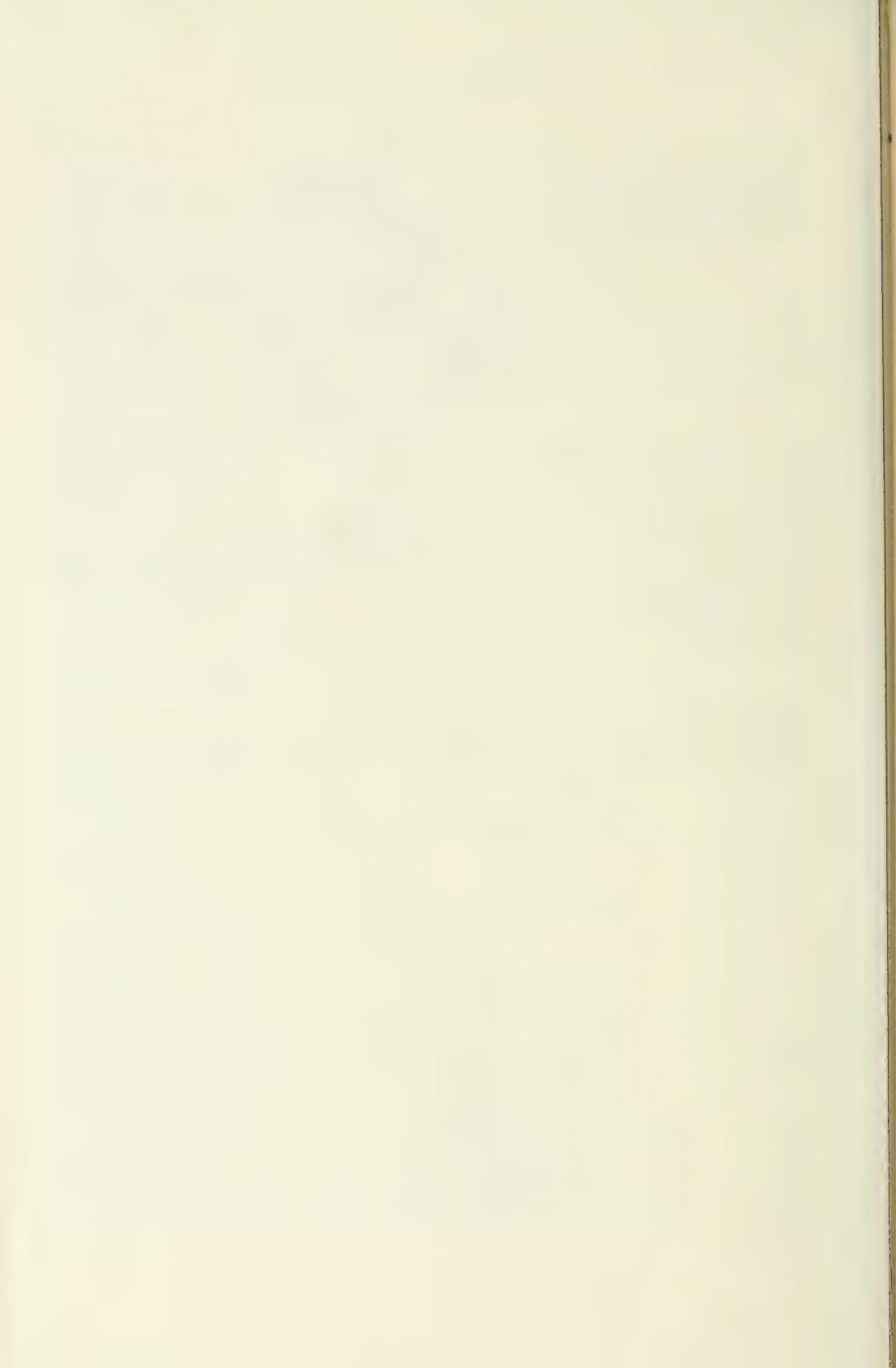
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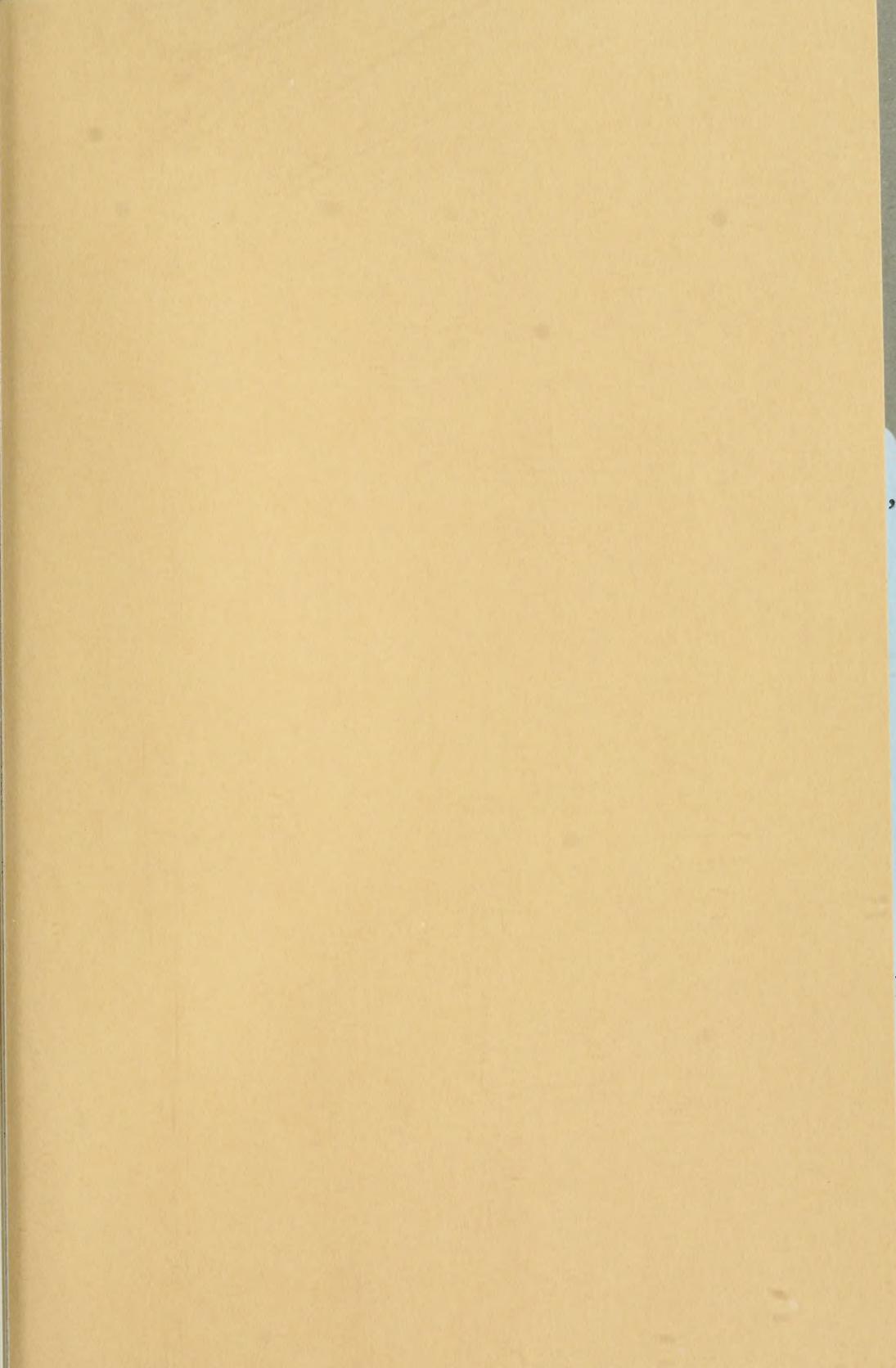
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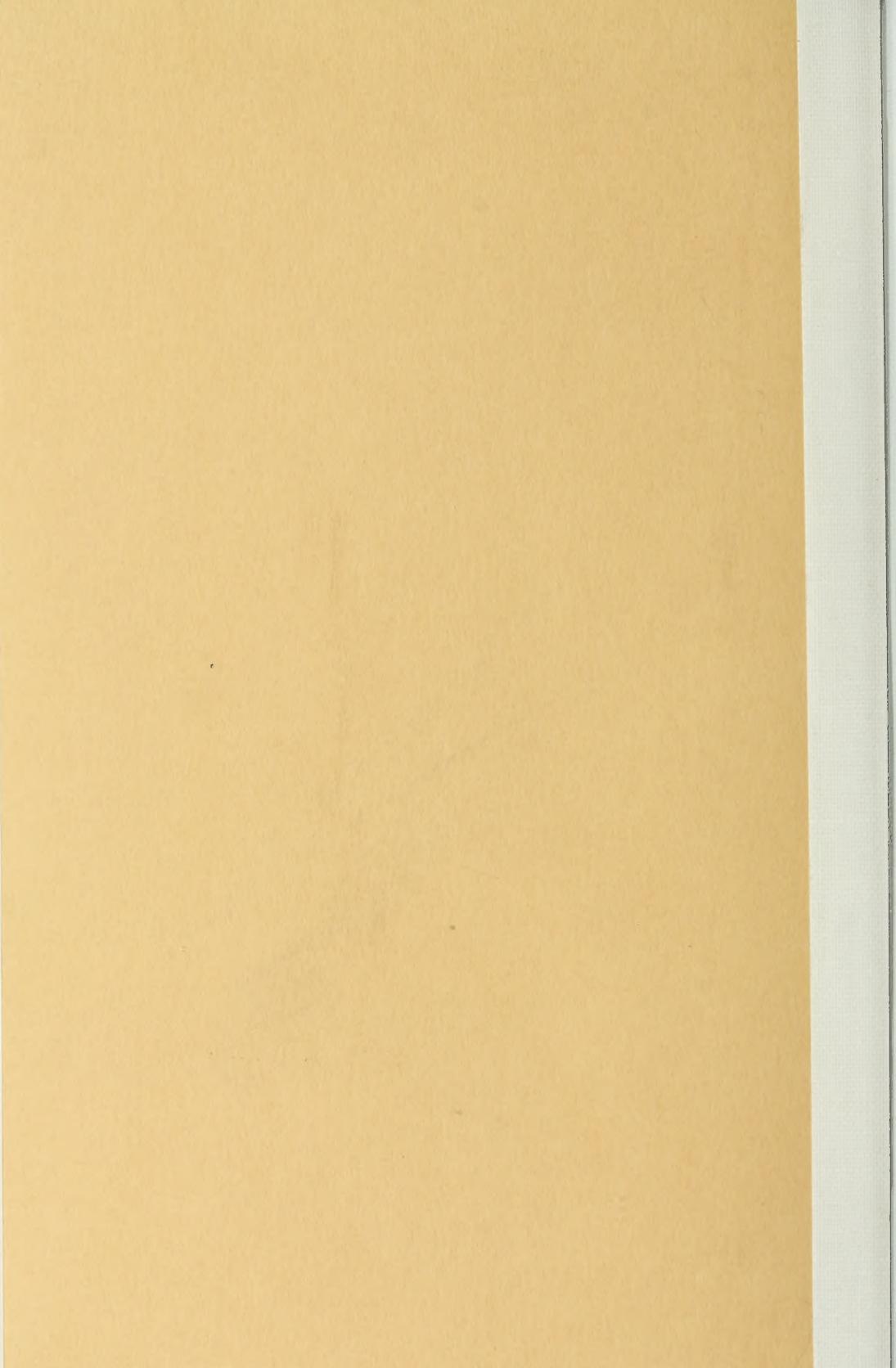
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